APPENDIX E: PUBLIC COMMENT CONCERN / RESPONSE REPORT

INTRODUCTION

The National Park Service (NPS), Sequoia and Kings Canyon National Parks (SEKI) has prepared a plan and final environmental impact statement for the Restoration of Native Species in High Elevation Aquatic Ecosystems (Restoration Plan/FEIS) in Sequoia and Kings Canyon National Parks (SEKI).

The purpose of the Restoration Plan/FEIS is to guide management actions by the NPS to restore and conserve native species diversity and ecological function to selected high elevation aquatic ecosystems that have been adversely impacted by human activities, and to increase the resistance and resilience of these species and ecosystems to human induced environmental modifications, such as nonnative fish, disease and unprecedented climate change.

Action is needed at this time:

- because nonnative fish have severely reduced native biological diversity and disrupted ecological function;
- to prevent the extirpation of two species of mountain yellow-legged frogs (*Rana muscosa* and *Rana sierrae;* MYLF) in the parks and to restore MYLF populations to many locations in the parks where they have been extirpated;
- to further the NPS's mission and policy directives to conserve native animals, plants and processes found in SEKI's aquatic ecosystems;
- because large scale restoration of more complex habitat (areas containing large lakes or clusters of many lakes with many and/or large connecting stream sections) is critical for native species and ecosystem recovery;
- to increase the resistance and resilience of native high elevation aquatic species and ecosystems to human induced environmental change; and
- to enhance and preserve the natural quality of wilderness character.

As an implementation level plan, the Restoration Plan/FEIS provides detailed guidance on a variety of issues including, but not limited to: nonnative trout eradication, using both physical methods and piscicide use; basin selection; fish disposal; site assessments; active frog restoration methods including translocations / reintroductions and antifungal treatments; monitoring and continuing research; use of helicopters, stock, and crew camps; and, adaptive management.

This public comment concern/response report provides a summary of the public comments received during the public review of the Restoration of Native Species in High Elevation Aquatic Ecosystems Plan and Draft Environmental Impact Statement (Restoration Plan/DEIS) and includes responses to the comments. Although the public outreach process attempts to solicit and capture the full range of public concerns regarding the proposal, this report only reflects input from people who chose to submit public comments. This report, therefore, does not necessarily represent the sentiments of the entire public. The NPS focuses on the content of the comment rather than the number of times a comment was received. This report is intended to be a summary of the comments received, rather than a statistical analysis.

PUBLIC COMMENT PROCESS SUMMARY

On September 26, 2013, SEKI released the draft Restoration Plan/DEIS to the public; federal, state, and local agencies; tribes; and organizations for a 60-day public review period. In October 2013, due to an extended shutdown of the federal government, and the unavailability of federal systems that allowed the review of the draft plan, the public review period was extended to December 17, 2013.

The parks' staff presented elements of the Restoration Plan/DEIS at one agency/tribal meeting on November 19, 2013 at the Sierra National Forest, Bass Lake Ranger District in North Fork, CA; and at the following three public meetings. Total attendance at the public meetings was 39. The public meeting schedule was as follows:

- November 19, 2013: University of California-Merced, Fresno Center, Fresno, CA
- November 20, 2013: Three Rivers Arts Center, Three Rivers, CA
- November 21, 2013: Eastern Sierra Tri-county Fairgrounds, Bishop, CA

The public were able to submit their comments on the project using any of the following methods:

- Electronically through the NPS Planning, Environment, and Public Comment (PEPC) website
- By submitting written comments in person at the public meetings or by hand delivery to the park
- By mailing comments to the NPS
- By emailing comments to the NPS

NATURE OF COMMENTS RECEIVED

During the scoping period, 123 pieces of correspondence were received. Many comments were related to (1) piscicide use, (2) methods for fish removal, and (3) active frog restoration. All correspondences were entered into the NPS PEPC website. Comments that were not related to the Restoration Plan/DEIS for SEKI were coded as outside of the scope of analysis and are not included in this report.

All substantive comments that were within the scope of the Restoration Plan/DEIS, regardless of their topic, were carefully read and analyzed. Similar comments were grouped into "concern statements," and these concern statements with NPS responses are provided in this report. Most concern statements include a representative *quote*, which is verbatim text from public comments, whereas other responses include a representative *comment*, which summarizes the topic of concern, but are not direct quotes. The supporting quotes have not been edited; therefore spelling and grammar errors are not corrected. These supporting quotes are followed by information as to whether the comment author was an individual, or representing an agency, organization, or tribe. The full text of all correspondences received during the public review of the Restoration Plan/DEIS can be found on the PEPC website at: http://parkplanning.nps.gov/aquatics under "Public Documents."

PUBLIC CONCERNS AND NPS RESPONSES

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

Concern 1: *The NPS needs to better explain the justification for the use of piscicides instead of the continued use of physical methods.*

Representative Quotes:
The DEIS fails to demonstrate that chemical treatments are necessary for achieving the overarching objective of the plan, which is to establish a network of fishless habitats for the benefit of frogs and other aquatic species. [Recreation Group, #110]

The document lacks the most crucial of all analyses, and that is whether it is truly necessary to apply chemical treatments to achieve the objective of establishing a network of refugia for mountain yellow-legged frogs. [Unaffiliated Individual, #112]

Response: In general, piscicides would be used where there is evidence (based on habitat assessments and previous fish removal efforts) that the water volume is too great or habitat is too complex for physical removal methods to be effective or efficient. The Restoration Plan/FEIS includes information explaining the reasoning behind the proposed use of piscicides (chapter 1, Background). To clarify, SEKI has proposed piscicide use in a subset of the proposed fish eradication areas. Park staff have been conducting fish removals in SEKI for approximately 15 years, and have learned from these efforts what habitat types are feasible using physical methods. The Restoration Plan/FEIS reflects this knowledge and directly factors into which methods are proposed at each site. Depending on the habitat, fish eradication can be achieved in many lakes and streams using gill nets and electrofishers (Restoration Plan/FEIS, chapter 1, Purpose and Need for a Plan). However, in other areas, the use of piscicides is necessary, and the more complex habitats needing piscicide treatment are important to the long-term success of restoring MYLF populations. Several additional alternatives were considered but dismissed in the Restoration Plan/FEIS (chapter 2). Additionally, genetic manipulation such as daughterless technology, which attempts to modify fish genes to eventually eliminate all females from a population, is in the early stages of development, is not a proven method (Britton et al. 2011), and even with this technology, fish are long-lived and could still persist for some time. Thus, it is not considered in the Restoration Plan/FEIS.

There are several factors that determine which type of treatment is necessary to accomplish fish eradication, and they relate to the feasibility of treatment methods, the probability of success, and the safety of crews conducting the work. The success of physical eradication methods in streams is primarily influenced by the length, size, and/or complexity of the treatment area. In lakes, physical eradication methods are effective for small to medium-sized lakes having accessible shorelines and no or relatively short or simple outlet streams before reaching a fish barrier. Simply applying more time using physical methods to a longer stream or a large, complex lake does not necessarily allow the park to meet eradication goals (e.g., Meyer et al. 2006). Depending on the habitat configuration, it can be very difficult to capture fish in streams and to determine if all fish have been captured, due to factors such as multiple braided channels, boulder crevices, undercut banks, woody debris, vegetation, and bubble curtains. In addition, (1) the typically low electrical conductivities of high Sierra streams allow fish to more easily swim away from electrofisher fields, and (2) electrofishing frequently misses the smaller fish size classes (Meyer et al. 2006), which then are given the chance to grow and breed in the absence of competition from the fish that are caught via electrofishing. Combine these difficulties with the need to capture all fish to achieve eradication, and it becomes apparent how the probability of success is diminished as length, size, and/or complexity of habitat increases.

Further, the high elevation, snowmelt-driven habitats in this plan typically have high water flows in June and July, leaving limited periods of lower flows in August and September when electrofishing is most safe and effective. This small window of time to electrofish, plus the considerable time necessary for gill netting, is too short of a period to allow for eradication to be achieved. In addition, in long stretches of stream with no barriers, fish have ample room to escape. Although block nets may theoretically limit fish dispersal, they are not feasible for this plan. Sites are remote and staffed by small crews with multiple duties, so crews would not be able to remove net debris (small branches, bark, caddisfly cases, heavy algae accumulation, etc.) frequently enough to keep nets from blowing out or becoming a wall of debris that can no longer catch fish.

With this information in mind, site assessments were conducted at each proposed removal site to determine which methods would be appropriate for achieving fish eradication. The results of those visits revealed that several sites would not be feasible using physical methods, due to having a large distance to the barrier (e.g., Amphitheater), or having excessive complexity (e.g., upper Evolution); these sites were proposed for piscicide treatment in the Restoration Plan/FEIS. Site assessments and further analysis determined that (1) two habitats proposed for physical eradication methods in the DEIS *may* only be feasible with piscicides (the outlet stream of Horseshoe, and part of the inlet stream in upper Bubbs); (2) two habitats proposed for piscicide use in the DEIS could achieve meaningful restoration using only physical methods (Barrett and Slide) by reducing the size of the treatment area; and, (3) one habitat proposed for piscicide use in the DEIS can be removed as a proposed fish eradication site (Moose Lake area of Tablelands) due to an abundance of nearby fishless habitat that can sufficiently support MYLF recovery in this park area. The Restoration Plan/FEIS has been updated to reflect these changes (chapter 2 and appendix B).

The Restoration Plan/FEIS proposes to use physical eradication even in selected stream locations where fish removal may be challenging because the probability for success is high. Physical removal methods are proposed for portions of McGee, upper Evolution, Barrett, upper Bubbs, Tablelands, Blossom, and Milestone. Although removing fish with physical methods would take several years, using physical methods has a high probability of success. In all areas proposed for piscicide eradication, park staff have determined that physical methods are not feasible and using physical methods has a low probability of success. The sites remain proposed for restoration because they have fish barriers which make them excellent restoration sites, and because they are important for creating fishless networks of critical MYLF habitats that have surface water connectivity, which is crucial for MYLFs to build and maintain self-sustaining populations that are resilient to environmental stressors. Although it was stated in the DEIS that piscicide treatment would be the preferred treatment method in a situation where time was critical for preventing the impending extirpation of a MYLF population, the final plan proposes physical treatments everywhere feasible and proposes piscicide treatments only where physical treatments were determined infeasible. After reevaluating the restoration areas, some large lakes and long stream sections proposed for piscicide treatment in the DEIS were either (1) excluded from the Restoration Plan/FEIS because restoring those areas would not be critical for the long-term recovery of native species (e.g., Moose Lake portion of Tablelands), or (2) the proposed methods were converted to physical treatment because site assessments revealed physical restoration methods would be feasible (e.g., Slide).

Some of the basins proposed for piscicide treatment can be eradicated of fish using a hybrid approach, in which the more logistically challenging and time-consuming route of physical fish eradication in the upper part of the basin is used in combination with piscicides to complete the treatment in the lower basin. Because the upper parts of basins typically have smaller streams and lower flows than the lower parts, physical methods (using an electrofisher) can accomplish fish removal from the inlet streams, but piscicides would need to be used to eradicate fish from the typically larger, longer and/or more complex outlet streams (see example in Restoration Plan/FEIS, appendix B). Piscicide treatments would be conducted every 1-3 years (i.e., each year a different basin would be treated), which would allow all basins proposed for piscicide use to be completed within 15-20 years. Each treatment would take place over a 5-10 day period.

The use of piscicides allows the restoration of a larger number of viable sites across the landscape and enables greater connectivity among restored habitats. Research on other species of amphibians has documented the importance of maintaining genetic diversity in isolated populations to increase the probability of persistence in the presence of disease and other negative effects of habitat change (Savage et al. 2015). In fragmented landscapes, where populations are small, genetic diversity is lower and populations have less potential to adapt to change (Johansson et al. 2007), such as exposure to emergent pathogens (Pearson and Garner 2005). Piscicides would help restore sites with increased connectivity and thus potential for greater genetic diversity, as well as larger lakes and more complex basins that have a greater potential to be resilient to impacts of warming climate.

Concern 2: *The NPS needs to provide additional information on the overall project objectives and how success will be measured.*

Representative Quote:
The DEIS alone does not provide the necessary information on factors that evaluate successful eradication objectives for physical or chemical treatments. [California Department of Fish and Wildlife, #117]

Response: The Restoration Plan/FEIS explicitly states the overall project objectives (chapter 1, Objectives of the Restoration Program), which includes policies within which the objectives are grounded. The level to which each alternative is expected to meet each project objective is provided in the Alternatives Comparison Table (chapter 2, Table 15). Project success would be measured by how well the project objectives are achieved upon completion of the plan's implementation.

In general, if nonnative fish are eradicated from any of the proposed fish eradication areas, it would restore high elevation aquatic ecosystem habitat, creating more favorable conditions for native species populations to persist and be more resilient to human induced changes to environmental conditions. Quantitative measures of success would include the percentage of water bodies restored to fishless condition and the number of restored frog populations. If active frog restoration actions help stabilize and recover endangered MYLFs in SEKI, it would help ensure the self-sustaining, long-term viability and evolution of MYLF populations within portions of their present and historic geographic range within the parks, and help maintain the genetic and ecological diversity of these species. The plan's implementation would organically stimulate development of research priorities and studies to investigate them. The adaptive management component as described in the Restoration Plan/FEIS (chapter 2, Elements Common to All Action Alternatives) would allow the refinement of project methodologies over time. Nonnative fish eradication and native species restoration and conservation would restore and protect natural processes in wilderness. Restoring the most habitat and native species populations possible over the plan duration, while allowing fish to remain in hundreds of waterbodies, would provide an appropriate range of visitor experiences and recreational opportunities at wilderness lakes and streams concurrent with minimizing the degradations that have occurred to the biological integrity of high elevation aquatic ecosystems. The Restoration Plan/FEIS does not state a restoration success threshold above which would equate project success and below which would equate project failure. Rather, if the project actions are implemented, it is highly likely to achieve a net gain in restored habitat, restored native species populations, and fulfillment of the remaining objectives, which would constitute a successful project.

Concern 3: *The plan should include a discussion of how the plan would influence the long-term ecological and evolutional processes that are necessary for species persistence.*

Representative Quotes:
Specifically, the DEIS contains no discussion of the broader vision of how the plan would influence the long-term ecological and evolutionary processes that are necessary for species persistence. [Recreation Group, #110]

The preferred alternative of using both physical and chemical fish eradication methods will allow SEKI to restore a more diverse set of aquatic habitats than would be possible using only physical methods. This more diverse array of restored habitats should allow the persistence of a much more spatially-representative set of mountain yellow-legged frog populations (and populations of other aquatic species) in SEKI than would be the case under the "no action" alternative. [University of California, #35]

Response: The Restoration Plan/FEIS contains background information and the purpose and need for this project, including how the plan would restore multiple high elevation aquatic ecosystems across the parks and substantially contribute to "long-term ecological and evolutionary processes that are necessary for species persistence." It would take a great amount of detail to describe how this project would influence long-term ecological and evolutionary processes; however, the Restoration Plan/FEIS includes much of this information (chapter 1, Background). See also the last paragraph of the response to Concern 1 for discussion of the importance of restoration on habitat connectivity and genetic diversity.

Concern 4: *The DEIS should provide a sufficient explanation and rationale for how the removal of nonnative fish from high-elevation water bodies, with toxins, will guarantee the MYLF population will survive, combat the chytrid fungus, achieve better defenses against climate change, and develop networks throughout the park.*

Representative Quote:
The rationale that the Park Service employs to justify use of chemical poisons in backcountry lakes, ponds, and streams is fundamentally flawed and severely overstates the supposed need to resort to chemical treatments. [Recreation Group, #110]

Response: The survival of endangered species, including the MYLFs, cannot be guaranteed. However, the Restoration Plan/FEIS presents several years of analysis that illustrate a thorough understanding of the (1) status of nonnative fish and endangered MYLFs in SEKI, (2) feasibility of fish eradication across SEKI's lake basins, and (3) active frog restoration techniques (e.g., translocations and reintroductions) available to complement fish eradication in achieving MYLF recovery. SEKI believes the proposed plan has an appropriately large spatial design to restore aquatic ecosystem structure and function and recover MYLFs at the scale of the parks. The key is to have in each conservation area fishless habitats that are large, diverse and connected to support self-sustaining MYLF populations [U.S. Fish and Wildlife Service (FWS) *in preparation*], and other native species, over time.

Fish eradication would (1) increase the size and connectivity of fish-free habitat, which would better withstand drying and warming expected under climate change; (2) allow existing MYLF populations to increase in size and better withstand chytrid fungus (briefly, greater population size equates to greater genetic diversity such that some frogs may have genes that enable them to withstand amphibian chytrid fungus, survive, and perpetuate the population in the midst of a new environmental stressor); and (3) provide restored habitat for re-establishing MYLF populations that completely died off due to fish and/or disease. As stated in the Restoration Plan/FEIS, piscicide treatment is the key tool that would allow fish to be eradicated in the basins where physical treatment is infeasible (see Concern 1, and chapter 1 and appendices C and J of the Restoration Plan/FEIS).

The specific water bodies targeted for piscicide treatment have evidence of current or previous MYLF presence, and thus possess the habitat requirements for MYLFs if nonnative fish were not present. However, several sites are not feasible for eradication using physical methods only (see Concern 1). Time is critical to these populations, which are in rapid decline. Even in habitats that are relatively simple compared to those at SEKI, successful restoration using physical methods can still take years of intense labor (Pacas and Taylor 2015). Piscicides are the only reliable tool available today to achieve fish eradication in these areas. Some of the targeted piscicide basins are critical for restoration because they are occupied by one of the few remaining MYLF populations or were occupied by MYLFs that recently died out. Restoring these populations to a healthier condition via fish eradication is the best chance to conserve them long-term. Their current state of being suppressed and fragmented by fish makes it more difficult for them to survive. For the few proposed piscicide basins in which MYLFs have already died out, fish eradication would allow populations to be re-established, filling in some of the large gaps in the species' range made by their decline.

The Restoration Plan/FEIS proposed action (alternative B) is designed to allow a much larger amount and diverse set of critical MYLF habitat to be restored than would be possible using only physical methods. This would allow a much more spatially-representative set of MYLF (and other native species) populations to persist in SEKI than would be the case under alternatives A or C. The restored MYLF populations would be larger, more genetically diverse, and more broadly distributed, in larger lakes or lake complexes connected by streams that are more climatically stable (Ryan et al. 2014). This would create populations of MYLFs more resistant and resilient to current and future threats than the small and fragmented populations that dominate SEKI today using only physical methods. Importantly, the larger restored populations would become source populations for translocations to allow for MYLF recovery in other areas. Therefore, piscicide use is critical to achieving the plan's primary objective of restoring aquatic habitats of sufficient size to allow the recovery of ecosystem structure and function at a park-wide scale.

Concern 5: *The NPS needs to better explain the translocation program and how it would benefit MYLF restoration.*

Representative Quote:
The DEIS fails to adequately disclose the high degree of uncertainty associated with the translocation of MYLFs to habitats from which fish are eradicated. [Recreation Group, #110]

Response: The DEIS provided background information on this topic in chapter 1, Purpose and Need for the Plan, and chapter 2, Elements Common to All Action Alternatives. The Restoration Plan/FEIS provides updates of these sections to better explain the translocation program and how it would benefit MYLFs. Some of the updated information is provided below.

MYLFs were afforded endangered status largely because (1) they have been eliminated from over 90% of their historic range, and (2) most remaining populations are small due to nonnative fish and disease, and fragmented and isolated by fish-containing habitat both within and between lake basins. Because MYLF populations have been extirpated from many basins, if translocations are not conducted, then there is no chance to re-establish extirpated populations and reclaim high quality fishless habitat that exists in many areas. While migration corridors are important to establish and maintain as fishless habitat, this is primarily effective at the within-basin scale, not at the park-wide scale. Natural recolonization is unlikely given the vast distances between occupied basins, and would still be of low probability even if frogs were in all historically-occupied basins given the vastness of the landscape. Re-establishing populations through translocation in key fishless locations can contribute toward recovery of the species. In addition, several of the proposed fish eradication basins recently lost all of their MYLFs. These areas contain suitable habitat because they were recently occupied by frogs. Fish eradication followed by translocations in these areas would further contribute to recovery.

In this plan prioritization is being given to reintroducing MYLFs into fishless areas that were previously occupied by MYLFs but they have since died out or declined. SEKI is large enough and there are several hundred waterbodies with records of recent MYLF presence in which to conduct translocations or reintroductions over the timeframe of this plan. In addition, augmenting small, chytrid-infected (i.e., vulnerable) MYLF populations with genetically-similar animals moved from larger persistent populations is another action that would contribute to the overall recovery of the MYLF species.

While translocations have had mixed success including some failed attempts, the important implication for management is that some translocations have been successful in re-establishing populations to locations where they completely died-off. Four populations in YOSE have been re-established using similar methods; and two recently translocated populations in SEKI show promise to become self-sustaining. Carefully coordinated and executed studies that closely monitor success of translocated frogs as well as source populations allows us to gain new information that would contribute to the success of the next effort. Success would be based on the on the ability of source populations to sustain frog abundance levels, and by documenting successful breeding and recruitment in re-established populations.

CHAPTER 1 – PURPOSE AND NEED – Guiding Policies, Regulations, and Laws

NEPA, APA

Concern 6: *The Restoration Plan/DEIS violates the National Environmental Policy Act and the Administrative Procedures Act.*

Representative Quotes:
NPS did not rigorously explore alternatives, it did not objectively evaluate alternatives, and it did not adequately explain why proposed alternatives were eliminated. 40 C.F.R. 1502.14(a). [Non-governmental Organization, #123]

Failure to provide site-specific analysis, or even ecosystem analysis, for any of the waterbodies NPS proposes to poison, is a violation of NEPA. [Non-governmental Organization, #123]

The DEIS is not compliant with NEPA for its failure to evaluate the cumulative effects of these projects. [Non-governmental Organization, #123]

The DEIS' conclusions that there are no known rare or endemic macroinvertebrate species in the project area (for the unstated reason that no one has looked for them) and that there will be significant adverse effects and possible significant cumulative effects to such rare and endemic species does not comport with NEPA or CEQA's mandates that agencies take a hard look at the impacts of a project and provide sufficient disclosure and analysis to the public and to allow for truly informed decision-making. [Non-governmental Organization, #123]

The DEIS does not adequately identify the impacts or environmental effects of scattering and burying dead fish containing rotenone on the high-altitude environment, on the species that live nearby or that may feed on the poisoned fish carcasses, the claimed breakdown of rotenone and the toxicant's other *ingredients in the particular and varied environments in SEKI where NPS proposes to conduct the activities, and the DEIS does not adequately analyze the effects and impacts. Failure to do so violates the agency's obligations under NEPA, and the APA, 5 U.S.C. 551 et seq.* [Non-governmental Organization, #123]

Response: With public input, the NPS developed and considered a range of alternatives – a total of 11 potential action alternatives and the no action alternative were originally identified for the plan. Of these, eight action alternatives were dismissed from further consideration for reasons described in detail in chapter 2. Three action alternatives and the no action alternative were carried forward for further analysis.

The Restoration Plan/FEIS provides a comprehensive discussion of the impacts from the four alternatives, including direct and indirect short-and long-term effects of the projects on water resources, rare and endemic species including invertebrates, and impacts from the disposal of treated fish. The document deals extensively with rotenone toxicity and its half-life; the sinking of nearly all fish carcasses in deep water minimizes exposure to other organisms. The NPS also considers other past, present, and future foreseeable projects in the area and on adjacent lands that could potentially affect similar resources, as is required in the cumulative effects analysis. In addition, site-specific surveys are included as an important component of this plan, both in evaluating sites for treatment alternatives, and for monitoring effects of selected treatments.

Concern 7: *The NPS does not meet the requirements under NEPA in regard to the proposed mitigation measures.*

Representative Quote:
However, the DEIS does not clearly indicate how the requirements of CEQA (California Code of Regulations, title 14, section 15000 et seq.) are met. For example, because NEPA does not require separate discussion of mitigation measures or growth inducing impacts, these points of analysis may need to be added, supplemented, or identified before the EIS can be used as an EIR. [Central Valley Regional Water Quality Control Board, #103]

Response: CEQA applies to state agencies in California and to federal agencies when state permits are required, as in this circumstance. As a federal agency, the NPS complies with NEPA which requires federal agencies to evaluate the impacts of major federal actions on the human environment, and with CEQA because it meets the requirements of California Code of Regulations title 14, section 15000 et seq.

The Council on Environmental Quality (CEQ) regulations indicate that mitigation measures can be integrated into EIS alternatives, stating, "Many Federal agencies and applicants include mitigation measures as integral components of a proposed project's design. Agencies also consider mitigation measures as alternatives when developing Environmental Assessments (EA) and Environmental Impact Statements (EIS)" 40 Code of Federal Regulations (CFR) § 1502.14(g), 1502.16(h). The Department of the Interior's NEPA regulations provide similar guidance (43 CFR § 46.130).

Reasonable mitigation measures were developed during the planning process with the input of subject matter experts and resource specialists. The parks also reviewed and considered the effectiveness of mitigation measures that had been used in similar projects on other federal and state lands and incorporated measures used in previous projects as appropriate. Mitigation measures were included as a component of the proposed action and treatment methods (i.e. project design) described in the Restoration Plan/FEIS. In addition, each site specific treatment plan would integrate the mitigation measures and a monitoring protocol as described in chapter 2, Mitigation Measures Common to All Alternatives.

Wilderness Act

Concern 8: *The plan does not adequately disclose the effects on wilderness.*

Representative Quotes:
Both physical and toxicant methods of nonnative fish removal will require substantial crew support to implement. The crew will include people, stock, helicopters (e.g., DEIS at 41, 44-45). The impacts that these crews, stock and helicopters will have direct and indirect environmental impacts on the application sites, and the DEIS has not adequately considered these impacts. (e.g. crews will leave their gear onsite over the winter months, DEIS at 45). [Non-governmental Organization, #123]

The use of chemicals that are highly toxic to all gill-breathing organisms is antithetical to the most fundamental goal of the Wilderness Act, which is to preserve and protect ecosystems in their natural condition. [Recreation Group, #110]

Response: The Restoration Plan/FEIS (chapter 4 and appendix A) provides a thorough analysis of how each alternative would affect the five qualities of wilderness character: untrammeled, natural, undeveloped, providing outstanding opportunities for solitude or primitive and unconfined recreation, and other features of value. As part of the planning process, the NPS prepared a minimum requirement analysis (MRA; appendix A). A key part of the MRA was to determine whether administrative action by the NPS is needed to restore native aquatic ecosystems, and if action is needed, to identify the minimum tools necessary to implement that action.

Through this process, the NPS determined that the project is necessary in wilderness to restore and preserve the natural character of wilderness (i.e. native ecosystems and native wildlife). The MRA considered several alternative methods to accomplish project objectives, and determined that a combination of helicopter and stock use is the minimum tool (appendix A). The use of chemicals (i.e. piscicides), although not specifically prohibited by the Wilderness Act, was considered in the MRA. While the use of chemicals results in short-term adverse effects on the untrammeled quality of wilderness character, as discussed in the Restoration Plan/FEIS (chapter 4), these adverse effects are considered acceptable and moreover are outweighed by the long-term beneficial effects that would result from the recovery of the high elevation native ecosystems to their natural condition (i.e. fishless), thus improving the natural quality of wilderness character that is adversely affected by the presence of fish.

The proposed project (including the limited use of piscicides in select locations) meets both the purposes of the Wilderness Act and the NPS Organic Act because it would result in long-term beneficial effects on the natural quality of wilderness character, and restore the native ecosystems of Sequoia and Kings Canyon National Parks.

NPS Organic Act and NPS Management Policies

Concern 9: *The proposed action goes against NPS preservation mandates and policies.*

Representative Quotes:
I can't imagine how this could benefit the whole ecosystem from all the invertebrates, other amphibians, insects, birds, and the life forms higher up on the food chain that would also be eating or drinking from poisoned waters. It would destroy the very wilderness character you are mandated to give the very highest protections to over any lands in the US. [Unaffiliated Individual, #115]

Is the Park Service really willing to run the risk of extirpating species it does not know are present? That seems a far cry from the Park Service's mandate to "preserve and protect" the natural communities of wilderness ecosystems. [Unaffiliated Individual, #112]

Response: Chapter 1 of the Restoration Plan/FEIS contains a discussion of applicable laws and policies and their relationship to the proposed restoration project. Among them, Section 4.4.4.2 of NPS *Management Policies 2006* recognizes that eradication of exotic plant and animal species is appropriate if (1) control is prudent and feasible, and (2) the exotic species interferes with natural processes and the perpetuation of natural features, native species or natural habitats. *Management Policies 2006* also allow for the use of pesticides when necessary and when other options to remove invasive species are not acceptable or feasible. During the planning process, NPS evaluated a wide range of alternative methods to remove nonnative trout. NPS retained for consideration those action alternatives that would further the purpose and need for the plan and that were consistent with applicable laws and policies. The NPS also developed and incorporated a number of mitigation measures and best management practices into the preferred alternative, as well as adaptive management techniques.

With regard to the potential extirpation of endemic species, the chance is remote that the number and extent of proposed rotenone treatments would extirpate anything but local populations of fishes. Untreated headwater streams would be present in most, if not all, basins, and not all waters in a basin would be treated with rotenone. Therefore, there would be refugia for other endemics, if present. In addition, common taxa would be expected to quickly recolonize treated areas; rarer taxa may not be detected for a number of years or indefinitely. If a rare taxon is not detected after treatment, there would be low confidence in concluding whether it were extirpated from the treatment area or present but not detected due to its rarity. If a treatment did cause the loss of a taxon from a treatment area, the same taxon would be expected to be present at other park sites and thus not be extirpated from the parks. An impact that would not be expected to threaten the continued existence of a species in the parks is defined as a moderate impact (see chapter 4, Table 22).

Concern 10: Trout have been occupying habitat in the parks for hundreds of years and should be considered native.

Representative Quotes:
The 'Non' native trout have been in these lakes and stream for over 100 years and as far as I am concerned are as 'Native' and precious to my wilderness experience and most others that I know. [Unaffiliated Individual, #1]

Response: As explained in the Restoration Plan/FEIS in chapter 1, Background, all trout are nonnative to all of the proposed restoration areas, which constitute up to 15% of nonnative fish-containing waterbodies in SEKI. Trout are considered nonnative because they were deliberately introduced by humans and, across western North American mountainous landscapes, they have significant negative ecological consequences for the entire ecosystems (Anderson 1971, Bahls 1992, Knapp 1996; see also appendix C for more detailed information). Per NPS *Management Policies 2006*, exotic (commonly referred to as nonnative) species are those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as nonnative, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place (section 4.4.1.3), regardless of how long that species has been there. In addition, under this plan nonnative trout would continue to exist in 85% of the fish-containing waterbodies in SEKI.

California Proposition 65

Concern 11: *The EIS must explain how their proposed actions do not violate Proposition. 65.*

Representative Quote:
This proposal violates California Proposition 65 because the proposed chemicals are known to cause cancer or reproductive toxicity. Federal or state agencies involved in this project may be exempt, but their contractors may not be. [Conservation/Preservation, #124]

Response: Neither rotenone or antimycin A are on the State of California Environmental Protection Agency list of chemicals known to the state to cause cancer or reproductive toxicity. Proposition 65 is not relevant to the proposed project.

California Porter-Cologne Water Quality Act

Concern 12: *The NPS must consider the Porter-Cologne Water Quality Act goals in the EIS.*

Representative Quotes:
The Restoration Plan/DEIS should indicate that the designated beneficial uses of the water bodies in the project area, as identified in the Central Valley Water Board's Water Quality Control Plan for the Tulare Lake Basin (Second Edition, revised January 2004) and Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Fourth Edition, revised October 2011) include municipal and domestic water supply, agricultural supply, hydropower generation, water contact recreation; non-water contact recreation; warm freshwater habitat; cold freshwater habitat; wildlife habitat; rare, threatened, or endangered species habitat; spawning, reproduction, and/or early development habitat; and freshwater replenishment. [Central Valley Regional Water Quality Control Board, #103]

This project would violate the no discharge without a NPDES permit requirements of Clean Water Act and the Porter-Cologne Water Quality Act. The NPS would need to obtain a NPDES permit for the discharge of aquatic pesticides to waters of the U.S. [Non-governmental Organization, #123]

Response: The Porter-Cologne Water Quality Act established a statewide program for the control of the quality of all waters of the state of California. The principles, guidelines, and objectives of the state water quality control are aligned with those of the Clean Water Act and Sequoia and Kings Canyon National Parks – that beneficial uses are to be protected, and impairment of water quality is to be avoided. As described in the Restoration Plan/FEIS (chapter 3, Water Quality), the State of California considers the surface water of the parks to be beneficial for wildlife and as freshwater habitat, contact and non-contact recreation, freshwater replenishment, and municipal and domestic water supply as indicated in the California Water Quality Control Board’s Central Valley Regional Water Quality Control Plans for the Tulare Lake Basin (CRWQCB 2015A)and the Sacramento and San Joaquin River Basins (CRWQCB 2015A) and the Sacramento and San Joaquin River Basins (CRWQCB 2015B).

The effect on water quality was evaluated in the Restoration Plan/FEIS (chapter 4). Prior to implementation, the NPS would obtain the appropriate permits from the State and the U.S. Army Corps of Engineers, including a NPDES permit for discharges from piscicide applications.

Clean Water Act

Concern 13: The NPS must consider the effects on water quality and must not violate the Clean Water Act.

Representative Quote:
The NPS must consider the antidegradation policy (40 CFR section 131.12) in the DEIS and must described how any degradation of the high quality waters in the project area is consistent with maximum benefit to the people of the State and is necessary to accommodate important economic or social development. The DEIS should also indicate how the discharge will not unreasonably affect beneficial uses of the affected water bodies. [Non-governmental Organization, #123]

Response: The Restoration Plan/FEIS describes the methodology for analyzing impacts (chapter 4, Water Quality) including the consideration of the antidegradation policy. The antidegradation policy is only one portion of a water quality standard. Part of this policy (40 CFR 131.12(a)(2)) strives to maintain water quality at existing levels if it is already better than the minimum criteria. Antidegradation should not be interpreted to mean that "no degradation" can or would occur, as even in the most pristine waters, degradation may be allowed for certain pollutants as long as it is temporary and short-term. Each alternative was examined to determine its effect on surface water (lakes, ponds, streams and runoff). Analysis focused on common biotic and abiotic water quality measurements that could be impacted by project actions. These include changes in hydrology, water chemistry, turbidity, and microbial communities. None of the alternatives would result in a degradation of the high quality waters in the project area, alter economic or social development, or unreasonably affect beneficial uses of the affected water bodies (see Restoration Plan/FEIS, chapter 4, Water Quality).

California Environmental Quality Act (CEQA)

Concern 14: *The NPS must prepare a document that complies with the requirements of the California Environmental Quality Act (CEQA).*

Representative Quote:
Supplemental information may be required in the final EIS to satisfy CEQA requirements, including, but not limited to a consideration of environmental impacts pursuant to California Code of Regulations, title 14, section 15126. [Central Valley Regional Water Quality Control Board, #103]

Response: The Restoration Plan/FEIS is a NEPA/CEQA compliant document. It discusses significant environmental effects on the proposed project (chapter 4) and includes significant environmental effects which cannot be avoided (chapter 4, Adverse Impacts that could not be avoided) and significant irreversible environmental changes which would be involved in the proposed project should it be implemented (chapter 4, Irreversible or Irretrievable Commitment of Resources). Mitigation measures are detailed in chapter 2 (Mitigation Measures Common to All Alternatives), as are alternatives to the proposed project. There is not potential for growth-inducing impact resulting from the proposed project. The project occurs in wilderness and there is no potential for population growth or economic growth in the parks' wilderness as a result of project implementation.

Endangered Species Act (ESA)/California Endangered Species Act (CESA)

Concern 15: *The NPS must analyze the effects to listed species such as the MYLF and Yosemite Toad in the EIS, and consult with the US Fish and Wildlife Service, per Section 7 of the Endangered Species Act, and must comply with the California Endangered Species Act.*

Representative Comments:
The NPS must analyze the effects to listed species such as the MYLF and Yosemite Toad in the EIS, and consult with the US Fish and Wildlife Service, per Section 7 of the Endangered Species Act. [Non-governmental Organization, #123]

Actions carried out by non-federal employees may result in the "take" of any species listed as threatened or endangered under the California Endangered Species Act (CESA), thus the California Department of Fish and Wildlife may need to issue an Incidental Take Permit (ITP) (Fish and Game Code Section 2080 et seq.), and consultation with CDFW is warranted. [California Department of Fish and Wildlife, #117]

Response: In February 2016, SEKI prepared a Biological Assessment per Section 7 of the Endangered Species Act to analyze the effects of the Restoration Plan/FEIS on listed species. The FWS responded to the NPS on May 25, 2016 with a Biological Opinion, included in appendix L. The FWS concurred that the Restoration Plan as proposed may affect, but is not likely to adversely affect the Sierra Nevada bighorn sheep, nor adversely affect its critical habitat. The FWS found that the proposed project is not likely to adversely affect critical habitat for the little Kern golden trout. The Service's biological opinion is that the SEKI Restoration Plan, as proposed, is not likely to jeopardize the continued existence of the Sierra Nevada yellow-legged frog, northern DPS of the mountain yellow-legged frog, Yosemite toad, and Little Kern golden trout.

It is the Service's biological opinion that the SEIKI Restoration Plan, as proposed, is not likely to destroy or adversely modify proposed critical habitat for the MYLF or Yosemite toad. The Service reached this conclusion because the project-related effects to the proposed and designated critical habitat, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will enhance the value of the affected key components, or PCEs, to provide for the conservation of these species based on the following: (1) effects to essential physical or biological features will be temporary; (2) these actions will not destroy any essential physical or biological features of the habitat; and (3) the Restoration Plan will enhance proposed critical habitat via removing predatory fish. The effects to Sierra Nevada yellow-legged frog and northern DPS of the mountain yellow-legged frog proposed critical habitat are small and discrete, relative to the entire area designated, short in duration, and are expected over time to appreciably enhance the value of the critical habitat for the conservation of the Sierra Nevada yellow-legged frog, northern DPS of the mountain yellow-legged frog, and the Yosemite toad. This information is included in the Restoration Plan/FEIS in chapter 4, Special-Status Species and in appendix L.

The NPS is not required to obtain an incidental take permit from the California Department of Fish and Wildlife (CDFW). However, CDFW reviewed and provided comments on the proposal and all substantive comments from CDFW were considered, and the plan updated where appropriate.

Resource Conservation and Recovery Act Of 1976 (RCRA)

Concern 16: *The NPS must consider the RCRA as part of the project because burying and scattering of dead fish constitutes a disposal because fish and poison may enter the environment, resulting in a substantial endangerment to human health and the environment.*

Representative Quote: *The DEIS Alternative B proposes disposal of killed fish by transporting rotenone and neutralizer-laden fish away from the water body, and disposing of the dead fish by scattering and burying them in nearby terrestrial areas away from trails and campsites. DEIS at 59. The Commenters believe that the dead fish, and the poison remaining in their carcasses, are 'solid waste' within the meaning of RCRA, that the NPS's action of burying and scattering would constitute 'disposal' as fish and* *the poison in them may enter the environment, and that leaving fish with poison in them may constitute and imminent and substantial endangerment to health, or to the environment.* [Non-governmental Organization, #123]

Response: The Resource Conservation and Recovery Act of 1976 (RCRA) does not apply in this situation. RCRA gives the Environmental Protection Agency the authority to control and manage hazardous waste. Per the RCRA, section 1004 (5), the term ‘‘hazardous waste’’ means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may—(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Per this definition, the disposal of dead fish as a result of project implementation does not constitute a hazardous waste. The concentration of rotenone that may be contained in fish tissue at the time of death would be so low that hundreds of fish would have to be consumed by humans or other animals to even have a chance at having a negative effect (Restoration Plan/FEIS, chapter 4, Vertebrates). This level of accumulation does not meet the RCRA definition of a hazardous waste. This conclusion is consistent with the product label for CFT Legumine™, which does not require treated fish to be removed from the habitat (Zoecon 2015). Similarly, trout collected from high elevation lakes in SEKI have been found to have low mercury (Hg) levels, which are well below levels of concerns for human consumption (Eagles-Smith et al. 2014). Although certain semi-volatile organic compounds have been found in fish in SEKI, the contaminant levels were below the EPA threshold for recreational fish consumption (Flanagan Pritz et al. 2014). Additionally, rotenone has a low tendency to bioaccumulate in fish (Gingerich 1986, EPA 2007A).

Since most lake systems in the high Sierra are oligotrophic (nutrient lacking), the best ecological option is to return nutrients contained in fish back to the aquatic ecosystem directly. Thus, floating fish would have their swim bladders punctured so they sink to the substrate of deep lakes. In addition, from a practical standpoint, burying potentially thousands of dead fish in shallow, high elevation soils would be very difficult to achieve, and could potentially act as a significant attractant for scavengers.

Wild and Scenic Rivers Act (WSRA)

Concern 17: *The NPS violates the WSRA because it does not make adequate provisions in the plan to prevent rotenone from entering wild and scenic rivers.*

Representative Quote:
However, "[t]he furthest downstream points in the two streams proposed for piscicide treatments are approximately 650 feet and 820 feet & upstream of the wild and scenic river boundary." (DEIS at 182). NPS does not make adequate provisions to prevent rotenone from entering wild and scenic areas. [Conservation/Preservation, #124]

Response: None of the proposed restoration sites are within designated or eligible wild and scenic rivers segments. All of the sites proposed for piscicide use, except one, are far from designated wild and scenic rivers or river segments. One site in Upper Kern basin that is proposed for piscicide treatment is near the headwaters of the North Fork of the Kern River, which is designated as “Wild” under the WSRA. The furthest downstream points in the two streams proposed for piscicide treatment are approximately 200 meters and 250 meters upstream of the wild and scenic river boundary. While no work would occur directly within designated sections of these rivers, proposed fish eradication basins would be located within the watersheds feeding these rivers.

Through treatment methods and project mitigation, the potential for rotenone to enter wild and scenic rivers is low. Rotenone would be neutralized by the careful addition of potassium permanganate to the water at established locations downstream from the treatment sites. Fish baskets would also be placed downstream of the neutralization station. Mortality of these fish would alert workers to potential releases of excess chemical in the event of human or equipment error and potential downstream effects. If this occurs, potassium permanganate levels would be increased to neutralize the excess rotenone, from the typical concentration of 3 ppm to no more than the maximum concentration of 5 ppm as described in this plan. In addition, users downstream would be alerted.

During and after rotenone treatments, water quality would be monitored to assess the effects of treatment on surface waters and bottom sediments. The monitoring would determine that: (1) effective piscicide concentrations of rotenone are applied; (2) sufficient degradation of rotenone has occurred prior to the resumption of public contact; and (3) rotenone toxicity does not occur outside the project area. An analytical laboratory would analyze water samples for rotenone and rotenolone concentrations as well as for volatile organic compound and semi-volatile organic compound concentrations. The parks would also develop and implement a spill contingency plan that addresses chemical transport and use guidelines, as well as spill prevention and containment that adequately protects water quality. The spill contingency plan would be maintained on site.

The analysis in chapter 4 of the Restoration Plan/FEIS concluded that the project would not degrade river values or water quality for any of the wild and scenic rivers located in fish eradication basins. In addition, the Wild and Scenic Rivers Act does not prohibit the use of piscicides.

CHAPTER 2 – ALTERNATIVES

Concern 18: *The NPS should provide detailed treatment plans describing the methods of applications, locations, numbers of treatments required at each site, and timing.*

Representative Quote:
The DEIS indicates that SEKI will develop site specific treatment plans during the years immediately prior to treatment, and that the precise areas to be treated by different methods will be developed following thorough surveys of each site. It is unclear what information will be included in these future treatment plans, and it is unclear what type of surveys will occur the years prior to and the year of treatments. The Department recommends that SEKI include additional language thoroughly describing the content of future site-specific Treatment Plans. [California Department of Fish and Wildlife, #117]

Response: All site assessments, which show treatment locations, have been completed. A site assessment example is included as appendix I in the Restoration Plan/FEIS. Treatment application methods are provided in the Restoration Plan/FEIS (chapter 2, alternative B). More detailed treatment protocols are also provided (appendix N), including an estimated implementation timeline. A second type of site assessment for proposed piscicide treatment areas would occur immediately prior to treatment, rather than be incorporated into this plan, because it would measure characteristics that change from year-to-year (such as stream flow and piscicide travel times), which are important for planning the specifics of a given treatment area. The results of these fine-scale assessments would be communicated to stakeholders using methods described in a project communication strategy, which is provided in the Restoration Plan/FEIS.

Concern 19: *The NPS needs to complete site assessments prior to making a final decision on which sites would be included in the physical and piscicide treatment plans.*

Representative Quote:
To better describe the actual conditions at each of the proposed fish eradication sites I would encourage SEKI to finish all site assessments during summer 2014 and include those assessments in the final EIS. [University of California, #35]

Response: All site assessments have been completed and an example has been included in appendix I in the Restoration Plan/FEIS.

There are two different types of site assessments, each with different purposes. The first type, which has been completed, was to determine which areas were or were not feasible for each type of restoration method (i.e., physical methods or piscicides). These site assessments also included information on the distribution of fish and amphibians, the location and reliability of waterfalls/cascades to act as fish barriers, lake size/depth, and spatial arrangement and connectivity of aquatic habitats in the area.

The second type, which has not occurred yet, requires more detailed information about the sites (i.e., more precise information on the distribution of amphibians, invertebrate surveys in the first two to three treatment sites, and certain habitat characteristics. The second type of site assessment is required to determine a specific treatment plan but not required to determine treatment feasibility. The second site assessment would help develop the specific treatment plan (e.g., how many piscicide metering stations and sprayers would be needed for stream and peripheral treatment areas, how much product would be needed to treat all of the aquatic habitat, and the quantity of potassium permanganate needed to neutralize piscicides along the outflow of the treatment area). The second type of assessment would occur immediately prior to treatment, rather than be incorporated into the Restoration Plan/FEIS, because it would measure characteristics that change from year-to-year, which are important for planning the specifics of a given treatment.

Concern 20: *The NPS needs to provide additional information about the selection of the proposed sites, including details on habitat features, barriers to fish passage, and fish presence/absence, and how the numbers of lakes/basins to be treated was derived.*

Representative Quote:
The DEIS asserts (pg. 41) that waterbodies were selected from across the parks to ensure the proposed sites would restore and conserve native species, genetic diversity and ecosystem processes in areas encompassing the geographic and elevational diversity contained within the parks. However, it provides no further information on how this was assessed. [Recreation Group, #110]

Response: Detailed habitat, fish population, and MYLF population data has been derived from an extensive number of lake surveys, studies, and restoration actions conducted by collaborating researchers and SEKI staff since 1997. These data were used to consider and select basins for proposed fish eradication by deriving (1) the location of existing or recently-died-out populations of endangered MYLFs that could benefit from fish eradication, (2) genetic diversity of MYLFs across the parks, (3) where eradication is likely feasible, and (4) how many sites could be completed in a 25-35 year time frame. Park staff then conducted site assessments to confirm feasibility, including whether restoration can be achieved with physical methods, or if piscicides are necessary. Whether a lake is too large to be feasible for physical eradication is determined from a combination factors, such as lake volume; maximum depth; shoreline accessibility; fish population structure and density; amount and locations of fish spawning habitat; and the size and complexity of tributaries. The determination is made by experienced staff and consulting with collaborators. This process gave us detailed information from which to develop and propose a park-scale plan heavily based on science and local experience.

Basin selection criteria are shown in the Restoration Plan/FEIS (chapter 2, table 7, and Elements Common to All Action Alternatives, Basin Selection). Alternative B describes the development of site-specific treatment plans.

Concern 21: *The NPS should provide information on how waterbodies selected for rotenone or physical treatment can withstand climate change.*

Representative Quotes:
The DEIS does not explain how the waterbodies selected for rotenone treatment relate to establishing MYLF populations that can withstand climate change or fungal infections. [Non-governmental Organization, #123]

Will climate change make it a futile effort? According to a recent article that I read, frog populations are experiencing a dramatic decline throughout the world. [Unaffiliated Individual, #100]

Response: The Restoration Plan/FEIS provides information on climate change (chapter 1, chapter 2, and appendix B). To summarize, fish eradication would substantially increase the size (surface area and volume) and connectivity of fish free aquatic habitat in each of the proposed fish eradication basins. These larger and deeper habitats would better withstand drying and warming expected under climate change as compared to the current fishless habitat in each basin that in many cases is small and shallow. Therefore, native species such as endangered MYLFs in each basin would have access to additional suitable habitat that would have a much better chance of persisting (not drying up) in the face of climate change. Improving habitat size and connectivity benefits additional native species in these basins and also improves genetic diversity (connecting disparate populations), contributing to more effective disease resistance.

Concern 22: *The NPS has not provided sufficient evidence that connectivity would be achieved in the specific lakes and streams proposed for treatment.*

Representative Quotes:
There is passing mention of the need to establish "whole basins" that are fishless, as well as to build connectivity among populations. However, there is no substantive, spatially explicit analysis of how that would be accomplished by the Plan. [Unaffiliated Individual, #112]

You need to concretely demonstrate that connectivity would in fact be achieved for the specific lakes and streams proposed for treatment. . . Justification needs to be provided on a site-specific basis. [Unaffiliated Individual, #112]

Response: As explained in the Restoration Plan/FEIS (chapter 2, Elements Common to All Action Alternatives) and in alternative B, the proposed action would result in a restored network of aquatic habitats for MYLFs and other native species that have improved connectivity at the basin scale.

Fish eradication substantially improves habitat suitability for native species by removing a major environmental stressor - predation and competition for food by nonnative fish. The high lake basins in SEKI consist of collections of lakes, ponds, and wetlands connected by streams. In basins occupied by nonnative fish, the fish typically occupy larger lake and stream habitats while endangered MYLFs are typically restricted to small and shallow pond and wetland habitats, which are vulnerable to drying expected under climate change projections (Lacan et al. 2008). Fish eradication removes the habitat fragmentation caused by nonnative fish, thereby substantially improving connectivity of suitable habitat between waterbodies.

The proposed treatment sites were included in the Restoration Plan/FEIS because they are important for creating fishless networks of critical MYLF habitats that have surface water connectivity, which is crucial for MYLFs to build and maintain self-sustaining populations that are resilient to environmental stressors (Pittman et al. 2014). As an example of fish eradication providing resilience for MYLF populations experiencing an outbreak of amphibian chytrid fungus, consider one of SEKI's long-term restoration areas, Sixty Lake Basin. By the early 2000s, fish were eradicated from three lakes. The MYLF populations in these three lakes were disease-free for approximately five years, during which time the frog populations increased substantially. The populations then became infected with amphibian chytrid fungus, and experienced die-offs. One lake, with no stream connectivity to other lakes, completely lost its MYLF population. The other two lakes, both with stream connectivity in a multi-lake complex, continue to have small, persisting MYLF populations. Observed patterns of chytrid-caused die-offs suggest that the MYLF populations in the two restoration lakes still containing MYLFs could have completely died out if fish eradication had not taken place (R. Knapp, unpublished data). Eradication provided several critical years during which MYLF populations were able to expand before they became infected.

Restoring MYLF populations to a healthier condition via fish eradication is the best chance to conserve them long-term. Left in their current state of being suppressed and fragmented by fish makes survival much more difficult. For the few proposed basins in which MYLFs have already died out, fish eradication would allow populations to be re-established, filling in some of the large gaps in the species' range made by their decline.

Concern 23: *The NPS needs to provide more details on how fish disposal will occur.*

Representative Quotes:
Give more detailed information on how the dead fish will be dealt with (the DEIS notes they will be sunk to the bottom of water bodies or buried, but this does not adequately identify or assess the risks of this proposal). [Non-governmental Organization, #123]

As written, it is unclear whether SEKI's proposed use of rotenone will adhere to the EPA guidelines for this piscicide. For example, rotenone users are encouraged to collect and bury dead fish (bullet #2). However, in numerous places in the DEIS it is stated that fish will be collected and either buried or scattered. [University of California, #35]

Response: The Restoration Plan/FEIS provides a description of fish disposal methods (chapter 2, Elements Common to All Action Alternatives) which has been modified slightly from the DEIS. Fish carcasses would be left in deeper waterbodies proposed for restoration (i.e., carcasses would remain in larger waterbodies, or they would be moved from small, shallow waterbodies to nearby larger waterbodies). Since most lake systems in the high Sierra are oligotrophic (nutrient lacking), the better ecological option is to return nutrients contained in fish back to the aquatic ecosystem directly. Thus, floating fish would have their swim bladders punctured so they sink to the substrate. In addition, from a practical standpoint, burying potentially thousands of dead fish in shallow, high elevation soils would be very difficult to achieve, and could potentially act as a significant attractant for scavengers.

Also, nonnative fish are essentially composed of nutrients that would otherwise be available to native biota within the same waterbody. Thus, returning the carcasses of fish to the waterbody from which they are removed (or to one nearby) is the most consistent approach with the NPS policy of maintaining and conserving native species.

Concern 24: *The NPS needs to provide additional details on how marshes will be treated.*

Representative Quotes:
One of the many troubling parts of this DEIS is its lack of description of the "marshes" NPS proposes to poison. There is no public record of EIS's or EA's that document or describe how a marsh would be poisoned. The DEIS merely states NPS may use a boat or raft; in other words, it sounds like NPS proposes to treat a marsh as if it were a lake or pond. [Non-governmental Organization, #123]

It is extraordinarily difficult to chemically spray every single pocket of water where a small fish may be residing. Further, rotenone quickly adsorbs to both emergent vegetation and sediment, reducing its effectiveness in ponds, marshes, and other wetland habitats. Consequently, achieving 100% fish eradication in these more complex habitats will likely take multiple treatments, probably over many years. [Recreation Group, #110]

Response: A more-complete definition of “marsh” habitats proposed for piscicide treatment in alternatives B and D is included in the Restoration Plan/FEIS. The marsh areas constitute a small proportion of the areas proposed for piscicide treatment. Many areas highlighted as marsh are ephemeral habitats that dry yearly. Large portions of the areas highlighted by yellow marsh labels in the maps included in appendix B of the Restoration Plan/FEIS would not require treatment because they would either be dry or unsuitable for fish occupancy. Additionally, many locations listed as marsh are essentially small, shallow ponds, rather than what many people think of as traditional marshes found at lower elevations. For example, one traditional definition of a marsh is “*a frequently or continually inundated wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions*” (Mitsch and Gosselink 2007, pg. 32). Areas labeled as marshes in the Restoration Plan/FEIS, apart from being consistently saturated and containing varying amounts of vegetation, are effectively small, shallow, open ponds, or small order stream widenings with some vegetation. Therefore, the term marsh is largely a misnomer in the context of the habitats highlighted in the Restoration Plan/FEIS, and probably better labeled as “ephemeral wetland habitats.” These areas are referred to as marshes to remain concise; however, it is understandable that this has led to some confusion about the proposed areas.

Concern 25: *The NPS needs to provide a better justification as to why currently fishless lakes would not be used in the translocation program.*

Representative Quotes:
The Park Service fails to provide information on currently fishless lakes and streams that currently provide potential refuge for MYLFs and other aquatic species. Again, this information is critical for making an informed decision about how the proposed treatment lakes fit into the broader scheme of restoration. [Recreation Group, #110]

Has the Department evaluated placing MYLF in these fishless basins and are the doing so? If not, why not? [Unaffiliated Individual, #52]

Additionally, there are hundreds of fishless lakes in the Sierra where the frog could be introduced... maybe try these first before gill-netting self-sustaining trout lakes. [Unaffiliated Individual, #46]

Restrict frog transplantation projects to the many lakes in the Sierra that are already devoid of fish. [Unaffiliated Individual, #75]

Response: Currently fishless lakes would be used extensively in proposed translocation and reintroduction efforts. For example, fishless waterbodies in which MYLFs are extant (or recently extirpated) would be considered for MYLF conservation actions. However, fishless lakes would not be used exclusively, in part because nonnative fish occupy a disproportionate number of large, deep, perennial lakes when compared with all available lakes in SEKI. MYLF populations require these larger, more persistent waterbodies to sustain populations in the long term. Therefore, fish eradication is needed to allow native species to recolonize numerous quality habitats from which they have been excluded by nonnative fish for decades.

Moving MYLFs into currently fishless basins where there are no records of MYLF occupancy is not recommended in the Restoration Plan/FEIS. The reasons include:

1. The MYLF populations of imminent conservation priority are those persisting in the presence of amphibian chytrid fungus. All persistent MYLF populations are small and many would not be able to sustain take from adult translocations until populations are larger. In most cases, MYLF populations could not expand until provided with additional habitat through fish eradication. Given that these populations are small and threatened with imminent extirpation, translocations and reintroductions should be focused on moving the available MYLFs into large, fishless habitats in which there are previous records of MYLF occupancy.

2. It is unnecessarily risky to attempt moving the small number of MYLFs available for translocations and reintroductions into areas not known to have contained MYLF populations in the past. There could be numerous factors that have naturally prevented unoccupied fishless areas from sustaining MYLF populations, including habitat unsuitability. The more reasonable approach is to utilize habitats in which MYLFs have been known to occur because these areas are currently suitable for MYLFs (or have been in the recent past).

3. Collaboration with captive rearing facilities is needed to increase survival of young frogs in infected populations, and to reduce infection intensities in adult frogs in large populations that become infected. This is an intricate process that involves collections, transportation, husbandry, antifungal treatments, reintroduction to the wild, and time needed for long-term survival and reproduction to ultimately achieve recovery. Current capacity at captive-rearing facilities is extremely limited, and SEKI is one part of a larger range of MYLFs that has declined by >90%. Therefore, SEKI MYLF populations would need to compete with populations from other regions for assistance from captive-rearing facilities. Captive-rearing facilities would be used when available, but the Restoration Plan/FEIS cannot rely exclusively on translocations and reintroductions. Additionally, literature shows that reintroductions and translocations can be successful, but they typically need repeated infusions before becoming self-sustaining (Dodd 2005, Griffiths and Pavajeau 2008). Although worth the efforts, additional reintroduction and translocation efforts would add to the complexity, time, and outside support needed for success.

4. Nonnative fish have caused severe effects across the parks' high elevation landscape. Eradicating fish has been shown to provide substantial ecosystem benefits. NPS mission and policies guide us to conduct this work when and where feasible. Restoring several fishless basins for native species is justified by policy, regardless of MYLF population status.

Over the 25-35 year timeframe of this plan, there is no to little need to consider additional fishless waters where there is no documentation of frogs occurring because there are sufficient numbers of fishless waters available where frogs occur or were known to occur.

Concern 26: *The NPS needs to be willing to research and use additional methods such as fyke nets, in addition to the methods proposed in the plan, and as an alternative to piscicide treatment.*

Representative Quotes:
Electrofishing alone will not result in extirpation of nonnative fish from streams, although downstream electrofishing into fyke nets can vastly increase capture rates…[Unaffiliated Individual, #39]

*Most of the proposed treatment lakes in SEKI have either golden and rainbow trout in them. Because these species must spawn in running waters, eradication should be possible through a combination of gill netting within the lakes, and trapping (fyke nets, minnow traps) or electrofishing in the inlet or outlet stream*s. [Unaffiliated Individual, #112]

Response: For a description of why piscicide treatment is needed, see the response to Concern 1. This response also describes why physical methods, which would include using devices such as fyke nets, would not be feasible for eradicating fish from the proposed piscicide treatment areas. Fyke nets are usually set in open water along the shoreline of lakes and use wings to direct fish into a fyke or box. In lakes, a fyke net is most effective for use with species of fish that favor cover associated with shoreline and not open water pelagic species such as trout (Lake 2013). Thus, fyke nets would not be effective in Sierra Nevada lakes where the trout are found in open water. Other types of traps (such as wire boxes that can trap fish at the mouth of inlet and outlet streams) are labor-intensive and need to be serviced daily during spawning season. While they would capture some of the trout that migrate out of lakes to spawn, they would not eliminate the trout population.

Concern 27: *The NPS needs to incorporate adaptive management into this project which includes an assessment of the impacts of piscicides on resident aquatic fauna, further research on contaminants, and be willing to modify the project as additional information warrants.*

Representative Quotes:
There remains uncertainty as to the actual impacts of rotenone treatments in SEKI. These uncertainties could be better accommodated using an adaptive management approach, in which intensive monitoring of the initial rotenone treatments is used to better describe the likely impacts of subsequent treatments and if necessary to redesign subsequent treatments to further minimize these anticipated impacts. This adaptive management framework should be described explicitly for impacts to water quality, stream ecosystems, and lake ecosystems. [University of California, #35]

The DEIS would be improved if it developed more substantively the adaptive management framework for rotenone-based fish removals. [University of California, #35]

Response: Monitoring surveys and studies would be conducted to assess how resident aquatic fauna responds to piscicide treatment, in particular MYLFs, Pacific treefrogs, and garter snakes, as well as invertebrates in at least the first two to three treatments. Results would be evaluated over time to determine if plan modifications are warranted. As described in the Restoration Plan/FEIS (chapter 2, Elements Common to All Action Alternatives), the NPS would continue to research and use newly proven and reliable methods in addition to those proposed in the plan. The Restoration Plan/FEIS is science-based and proposes to continue using research to improve management responses to achieve aquatic ecosystem recovery. As new technologies and/or reliable techniques emerge, SEKI would research and consider them for incorporation into the plan.

Concern 28: *The NPS needs to provide information on site selection and how the sites proposed for treatment have been considered for the effects to anglers.*

Representative Quote: *It is unclear what, if any, evaluations were conducted within SEKI to survey angling use/effort at project sites. Some of the waters proposed for trout removal are near or adjacent to* *major trails and although they may not be destination fisheries, they likely provide supplemental food for backpacking anglers. With limited effort, the Department found references in recent angling publications (Beck, S. 2000, Trout Fishing the John Muir Trail. Frank Amato Publishing, Portland, OR) specifying some of the proposed treatment waters as quality fisheries. There does not seem to be an assessment of the effect to specific fisheries, but rather a statement that a large percentage of waters will still be available to anglers without regard to the quality or level of use for specific waters.* [California Department of Fish and Wildlife, #117]

Response: Effects to anglers are analyzed in the Restoration Plan (chapter 4, Environmental Consequences). A vast majority of quality angling opportunities in SEKI would still be available, even if all sites proposed for aquatic restoration are approved. There are approximately 549 waterbodies containing nonnative trout and up to 85 (about 15% of fish-containing waterbodies) are proposed for fish eradication in the Restoration Plan/FEIS.

As discussed in public scoping in 2010, numerous high-quality and high-use recreational angling areas were excluded from the proposed restoration plan. Information was compiled on angling areas from public scoping, angler interviews, published and online literature on fishing, and NPS staff observations and reports. A majority of the known highest quality angling sites in the parks are excluded from this plan.

Angling is an important part of the recreational experience for many visitors. The work proposed in this plan maintains a large and diverse array of angling areas throughout the parks. It is inevitable that every location proposed for nonnative fish eradication will be the preferred destination for a subset of people who seek out angling opportunities. However, as discussed in the Restoration Plan/FEIS (chapter 1, Purpose and Need for the Plan), the NPS has a responsibility to preserve and protect native species. NPS management policies recognize that resource conservation takes precedence over visitor recreation. The policy dictates, "Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant" (NPS 2006A, Section 1.4.3).

Actions proposed in the Restoration Plan/FEIS maintain a balance between protecting and enhancing habitat for native species, and preserving numerous recreational opportunities for nonnative fish angling. (Refer the Restoration Plan/FEIS, chapter 2, Elements Common to All Action Alternatives).

Concern 29: *The NPS needs to include a communications plan in the EIS to explain how they would inform the public and partners about the selected treatment schedule and activities.*

Representative Quotes:
Once the restoration plan is finalized and adopted, the bodies of water targeted for fish removal should be: (1) Listed online on the Seki website well before start of removal operations, perhaps as a link on the "Wilderness" section of the site. (2) Locations of the fish removal sites should be given to those acquiring or reserving a wilderness permit, for such information will be useful for backpackers in weighing alternatives for their trips. This will reduce the number of unpleasant "surprises" for wilderness hiker-anglers and help keep the restoration efforts in the public favor. [Unaffiliated Individual, #91]

Present the schedule of poisoning by year and specify frequency of poisoning each habitat per year. [Non-governmental Organization, #123]

There needs to be an obvious public communication plan attached to any of the alternatives chosen, with approach (physical or Piscicide treatment) so the recreational user can make plans to avoid a treatment area if desired. This is a matter of public transparency on what is happening, where it's happening and when. [Unaffiliated Individual, #108]

Response: The Restoration Plan/FEIS includes a communication strategy to guide outreach efforts shortly before and during each piscicide treatment. This information would be available during treatment periods through a variety for formats, including notices provided to visitors at wilderness permit stations, and notices on the parks' website. The information provided would be the specific areas affected (including lakes and streams, especially stream sections near downstream trail crossings) and length of closures (e.g., at least 72 hours after treatment has been completed). Additional information regarding communications is discussed in Concern 30 of this report.

Concern 30: *The NPS needs to include in the plan increased efforts to educate the public about the restoration project, including the threats amphibians face and the importance of protecting remaining amphibian populations.*

Representative Quote:
The NPS could create publications with pictures of native and non-native fish along with area-specific fishing regulations to educate visitors. [Unaffiliated Individual, #26]

I also encourage the National Park Service to increase its efforts to educate the public about the threats amphibians face and the importance of protecting remaining amphibian populations. [Unaffiliated Individual, #76]

Response: Education and public engagement are essential components for facilitating public support for native species conservation and management activities aimed to protect park resources. SEKI has developed a number of products to educate visitors about MYLFs and aquatic ecosystems including web pages and videos, and various public presentations and will continue to work with agencies and partners to develop educational materials and programs.

CONSIDERED BUT DISMISSED

Concern 31: *The NPS should consider utilizing fishermen for fish removal activities as part of the restoration effort.*

Representative Quote:
I propose that the NPS should launch a public trout-removal campaign, and call for fisherman to act in solidarity with their beloved national parks. [Unaffiliated Individual, #89]

Response: This idea was considered but dismissed from further analysis because of the reasons described in the Restoration Plan/FEIS (chapter 2, Alternatives Considered But Dismissed from Detailed Analysis). To elaborate, this is an understandable idea, but one that is not feasible for achieving fish eradication, because every single fish needs to be removed from the treatment area in order to achieve project objectives. In 15 lakes eradicated of fish in SEKI from 1997 to 2014, it has taken an average of three to four full years (summer and winter) of continuous gill netting using many nets per lake, plus simultaneous repeated electrofishing of all connected stream habitat throughout the summer, to achieve eradication. This work was largely produced by a team of two to three full-time summer technicians at each eradication basin. A public fishing campaign in an eradication basin might temporarily reduce the number of fish in targeted lakes and streams, but would not remove all fish. In addition, due to the remote locations and high elevations of the proposed lakes (many of the proposed lakes are 15 miles or more from the nearest trailhead, at 11,000 feet or more, and require on- and off-trail passes to reach them) the park would be unlikely to recruit a sufficient number of volunteers to carry out the campaign. In addition, coordinating volunteers would greatly increase the logistical burden of this project. Therefore, this idea was dismissed from further analysis.

Concern 32: *The NPS should consider using drought conditions to eliminate the need for piscicide use.*

Representative Quote:
The difficulties in treating complex wetland habitats can be alleviated somewhat with strategic planning. The spatial extent of wetlands varies considerably among years as a function of total precipitation during the winter. In drought years, many marshy areas effectively dry up, and fish are forced to move back to the stream channel, where they can be more easily captured using physical methods. . .This is a viable alternative to the use of chemical treatments, and should have been considered in the DEIS. [Recreation Group, #110]

Response: Some feedback was received during public review of the DEIS suggesting that the NPS use current drought conditions to facilitate the exclusive use of physical fish removal methods. Episodic events such as droughts or low water years could potentially make physical methods somewhat more feasible for fish eradication. However, predicting, planning, and relying on such events is not a viable alternative for recovering MYLFs. It is not feasible or prudent to design a long-term restoration plan that is dependent on a particular weather pattern to be successful. Based on previous successful physical restoration work, physical methods can take from 3-10 years, depending on the site. Therefore, a three-year drought would be the minimum necessary, with the hope it dries aquatic habitats enough to potentially eradicate fish using physical methods. In addition, a crew would have to be ready to start project work in that location in the first year of the drought. Crews cannot be funded or scheduled in this manner. Once restoration is initiated at a site, that site must be consistently worked until eradication is achieved, and then a new site can be started. In addition, there is no way to predict that the subsequent years would also bring the drought conditions needed for eradication using physical methods. This idea was not considered in the DEIS because it is not a viable alternative; however, it was included in the DEIS as a potential additional action alternative, and was dismissed from further consideration.

CHAPTER 3 – AFFECTED ENVIRONMENT

Concern 33: *The NPS does not provide enough information on mountain yellow-legged frog natural history and demographics to allow for informed decisions.*

Representative Quote:
The document fails to disclose any information on the current distribution and abundance of MYLFs within SEKI. This makes it impossible for the reader to evaluate (1) the potential adverse influence of proposed treatments on existing frog populations, (2) whether recolonization of treated habitats is likely through natural dispersal processes or will require translocation of frogs from other populations, and (3) whether the removal of fish will significantly improve connectivity in habitats within and among basins. [Recreation Group, #110]

Response: A wealth of research has been conducted on MYLFs in SEKI. The Restoration Plan/FEIS discusses MYLF natural history and demographics throughout the document, including information on their natural history, inter-species interactions, and demographics (chapter 1, Purpose and Need for the Plan and Background; chapter 4, Special Status Species; and appendix J). All recommendations regarding the proposed treatments on existing frog populations were formulated under the guidance of professional researchers, are aligned with the MYLF Conservation Strategy (a multi-agency document that is the foundation for a species' recovery plan (FWS *in preparation*), and would be approved by the U.S. Fish and Wildlife Service (FWS) per Section 7 of the Endangered Species Act).

Concern 34: *The NPS should disclose that the real cause of MYLF decline is disease caused by amphibian chytrid fungus (Bd), or a combination of disease and environmental contaminants*

Representative Quotes:
I don't think there is enough proof that fish are the main reason for the frog decline. [Unaffiliated Individual, #68]

What scientific studies have proven that the frog decline in the Sierra is due to fish predation? [Unaffiliated Individual, #84]

Wasting tax payer dollars destroying non-native trout in pristine mountain lakes with the excuse that they have caused the demise of the yellow legged frog when studies have shown that it is a worldwide fungus. [Unaffiliated Individual, #31]

Response: Chapter 1 and appendices C and J in the Restoration Plan/FEIS provide extensive information on causes for the MYLF decline.

Systematically collected evidence unequivocally shows that nonnative trout are a primary reason for MYLF declines (Bradford et al. 1994B, Knapp and Matthews 2000a, Vredenburg 2004, Finlay and Vredenburg 2007). In the specific instances when frogs are persisting in the same basin with fish, it is because the frogs have access to fishless habitat. Examples of fishless habitat include the shallow edges of lakes where there are boulder crevices inaccessible to fish, or small side pools separated from the main waterbody by shallow and/or thickly vegetated channels through which fish cannot pass. Conditions like this exist in small portions of many fish-containing basins. However, nearly all quality habitat in the main waterbodies are occupied by fish, and therefore unsuitable for amphibians. Nonnative fish have also been found to negatively impact the entire aquatic ecosystem, including zooplankton, macroinvertebrates, snakes, and birds (Knapp 1996, Knapp et al. 2001, Matthews et al. 2002, Knapp et al. 2005, Finlay and Vredenburg 2007, Epanchin et al. 2010).

Amphibian chytrid fungus is also a major factor in frog declines worldwide, including MYLF populations in SEKI. Amphibian chytrid fungus exacerbated the effects of nonnative fish, resulting in further MYLF declines and local extirpations. Some MYLF populations in SEKI have persisted with amphibian chytrid fungus and others that have been extirpated. Research has shown that although infected with amphibian chytrid fungus, some frogs can survive, and some populations can persist (or even increase) while chytridiomycosis is present (Jani and Briggs 2014, Knapp unpublished data; see also Briggs et al. 2010, and Knapp et al. 2011). In SEKI, the chance of persistence for populations infected with amphibian chytrid fungus is low, since many more infected populations have been extirpated than have persisted. However, a data set that describes the spread of amphibian chytrid fungus across SEKI from 1999 to 2012 was used to analyze the fate of 186 MYLF populations in SEKI (Knapp, *in preparation*). Several factors were assessed to examine their influence on whether a population was still present at least 4 years after a die-off. The population size at the time of the die-off was the most important predictor. That is, the larger the population, the better its chance of persisting with amphibian chytrid fungus. (The only other slightly significant predictor was snow depth during the previous winter—expressed as the difference from the long-term average—which had a negative effect. That is, bigger snow years had a slight negative effect on frog populations.) This result, based on a large data set, suggests that nonnative fish eradication near MYLF populations is vital for population persistence. Not only does eradicating them allow frog populations to increase in size, but it also increases the probability that MYLF populations would persist in the presence of amphibian chytrid fungus.

Contaminants have been suggested as leading to—or exacerbating—MYLF population declines, however, recent research did not find a negative association between pesticides and the MYLF decline in SEKI (Bradford et al. 2011). Rather, the pattern of decline was more consistent with the pattern of amphibian chytrid fungal infection as it spread through populations in the parks. In addition, other research examined the effects of four insecticides alone, or as a mixture, on the development and metamorphosis of Pacific treefrogs in the presence or absence of amphibian chytrid fungus (Kleinhenz et al. 2012). Results "did not support the prediction that effects of [amphibian chytrid fungus] would be greater in the presence of expected environmental concentrations of insecticide(s), but it did show that [amphibian chytrid fungus] had negative effects on responses at metamorphosis that could reduce the quality of juveniles recruited into the population." Specifically, amphibian chytrid fungus slowed down the metamorphic response by lengthening the larval period and slowing down the time of tail resorption.

Therefore, primarily due to nonnative fish and amphibian chytrid fungus, the MYLF populations across the Sierra are in peril. Add probable climate effects over time, and extinction is a distinct possibility unless intervention occurs and is effective. Amphibian chytrid fungus has proven more difficult to mitigate than fish, but it is likely effectiveness would improve over time via continued research and adaptive management. As a result, fish eradication in strategic locations is a primary restoration tool being recommended by the MYLF Conservation Strategy and the Restoration Plan/FEIS.

Concern 35: *The NPS should provide information on past restoration efforts and the result of these efforts.*

Representative Quote:
The DEIS discloses that past attempts to transfer frogs have, with few exceptions, been unsuccessful. The document fails to discuss the implications of this in terms of the overall recovery effort. [Recreation Group, #110]

Response: Information on past and ongoing restoration efforts within and outside of SEKI is provided in the Restoration Plan/FEIS (chapter 4, Cumulative Effects) which has been updated based on the most recent work.

To summarize, there are several strategies that have been used in the region for the translocation/reintroduction of MYLFs. Frogs for translocations/reintroductions have been provided by 1) collecting eggs, tadpoles, and/or juvenile frogs from targeted diseased populations, growing them to adulthood in a captive-rearing facility to get them past the juvenile survival bottleneck, immunizing them to develop disease resistance (Murphy et al. 2011, McMahon et al. 2014), and reintroducing them to the same location from which they were collected; 2) direct translocation into previously occupied habitats using adult frogs from one, or several (to increase genetic diversity and improve the potential for disease resistance) "persistent" populations within the same clade that are surviving with disease, and have enough abundance to withstand a small take (Knapp et al. 2011); or, 3) collecting adults from a nearby, genetically-similar, and currently large population that is not yet diseased, immunizing them to develop disease resistance, and then translocating them to previously occupied habitats where frogs were extirpated due to a combination of fish and disease impacts. (Knapp unpublished data). All of these scenarios have been attempted for MYLF recovery in the Sierra Nevada and southern California. While there have been some unsuccessful attempts (Fellers et al. 2007, Knapp et al. 2011, FWS 2012), there have also been several successful attempts thus far (Knapp et al. 2011, FWS 2012, Knapp unpublished data). In YOSE, four populations have been re-established for 2-8 years, and in SEKI, three populations have been re-established for 2 years. Therefore, it is promising that relatively reliable frog translocation/reintroduction methods would be developed. Even if these methods are not 100% successful, every population re-established or augmented would be a net gain and would be critically important for the long-term restoration, recovery, and conservation of both MYLF species.

There are many records of individual waterbodies, and collectively basins, which have been occupied by MYLFs (Jennings and Hayes 1994, Knapp 2003, Vredenburg et al. 2007). The basins proposed for restoration in the Restoration Plan/FEIS meet habitat requirements of the MYLFs. All of the basins support (or supported) MYLF populations of varying sizes. Helping to expand existing populations (and re-establishing populations that completely died out) provides the best chance for long-term MYLF recovery. Recovering frogs in many of these basins would vastly improve the status of the two species, allowing MYLFs to persist over the long term, and, if successful, ultimately be removed from the endangered species list.

SEKI has several MYLF populations that are not yet infected with chytridiomycosis. Most of them are large, including the largest populations of *Rana muscosa* and *Rana sierrae* in the range of each species. When amphibian chytrid fungus inevitably spreads to these populations, there would most likely be a severe die-off in which most or all adult frogs do not survive. Before these large populations become infected, SEKI is working closely with researchers to determine the effectiveness of translocations using frogs from these populations. In 2013 SEKI permitted researchers to collect adult frogs from an uninfected MYLF population that had increased to a large, sustainable level following fish eradication. The frogs were transported to a lab and exposed to amphibian chytrid fungus to induce infection and attempt to activate an immune response. Once infected, they were cleared of the disease with an antifungal treatment, and reintroduced to the wild. Treated frogs were released, in equal numbers, to three lakes in three basins, including two lakes associated with recent fish eradication. Preliminary results to date are encouraging. Monitoring trips in 2014 found frogs in each lake; all appeared large and healthy, and several had migrated to adjacent waters - another sign of successful acclimation. Further, tadpoles were detected in two lakes, demonstrating that successful breeding had occurred. If successful frog breeding continues to occur, and at least one MYLF population can be re-established, then the efforts would be deemed successful and have implications for future restoration progress in additional areas identified in the plan.

In 2015 tadpoles and recently metamorphosed frogs were collected from two infected MYLF populations in SEKI to rear them to adulthood and immunize them in zoos, before reintroducing them to the locations from which they were collected. This will hopefully add a substantial number of resistant adults to these populations, which can then breed for years and increase the chance for the population as a whole to develop persistence instead of being extirpated. All of these individuals are expected to reach adulthood in time for immunization and reintroduction in 2016 and 2017. Results will be studied closely to incorporate findings into future restoration work.

Concern 36: *The NPS should disclose the probability of large scale success of restoration in light of the current demise of the MYLF from chytrid fungus.*

Representative Quotes:
While you describe treatments for the chytrid fungus in mylf there appears to be no evaluation of the probability of large scale success of the treatment and the creation of long term viable populations of mylf. It appears that the odds of the operation being a success but the patient dying anyway is quite high. [Unaffiliated Individual, #41]

Can you promise/certify that your actions will work and will not have adverse effects on the living things within SEKI that drink water from the lakes and streams? Will the use of a piscicide in over 38 lakes and some 27 miles of streams have no side effects on anything but the trout, and is the cost of such efforts without knowing the absolute probability of success worth the risk? [Unaffiliated Individual, #52]

Response: Chapter 1 of the Restoration Plan/FEIS describes the success of completed fish eradications in SEKI and elsewhere in the Sierra Nevada. The Restoration Plan/FEIS also describes results to date of frog antifungal treatment, translocation/reintroduction, immunization, and captive-rearing; as well as evidence of population adaptation to amphibian chytrid fungus in the Sierra Nevada (chapter 1, Background). Given there have been successes in each restoration category, and the expectation that management effectiveness would improve over time with continued research and experience, the probability of large scale success of restoration in SEKI is moderate to high.
There is a large amount of science upon which this plan is based, including dozens of studies in the Sierra Nevada and many in SEKI, going back several decades (see the references cited in chapters 1-4 and appendices C and J). Habitat restoration via nonnative fish eradication, along with current efforts and studies to develop reliable active frog restoration techniques including antifungal treatment, translocation / reintroduction, immunization, and head-starting, are crucial for restoring aquatic ecosystems and recovering MYLFs over the long-term.

The MYLF Conservation Strategy (FWS *in preparation*), which will be the foundation for a MYLF Recovery Plan, is recommending a toolbox approach that addresses the primary threats to MYLFs. First, nonnative fish eradication would restore large critical habitats, that can withstand drying and warming expected under climate change, to their previously fishless condition, which would increase amounts of suitable MYLF habitat and improve connectivity between lakes, ponds, marshes and streams within treatment basins. Restored habitat can allow existing MYLF populations to expand (Knapp et al. 2007) or provide high quality habitat for recently lost populations to be re-established using translocations / reintroductions (Knapp et al. 2011, FWS 2012). The latter is necessary because nearly all lake basins in SEKI are isolated from each other by steep, high and dry slopes and ridgelines, and separated by nonnative-fish-containing streams (Bradford et al. 1993), and thus frogs from the few remaining MYLF populations are not able to replenish populations that have completely died-off. Second, most of the remaining MYLF populations are hindered by recent onset of disease (chytridiomycosis) in which few adult frogs naturally survived the disease outbreak. In the ensuing years, very few offspring from those few surviving adults are able to survive from juvenile frog to adulthood - until the population as a whole can gradually adapt to the disease and produce resistant individuals. These populations are highly vulnerable to dwindling to zero if the adults die before the population can stabilize and recover through increased recruitment. Therefore, these populations would benefit by receiving an infusion of disease resistant adult frogs. Third, MYLF populations in many basins have completely died-off, primarily due to nonnative fish and/or disease, and reintroductions are needed in order to re-establish MYLF populations in these basins. Together, the toolbox approach of fish eradication combined with several active frog restoration techniques would provide the best chance for recovering endangered MYLFs over the long-term. In addition, most non-target species populations are expected ultimately to benefit as a result of fish removal.

For more information on potential non-target effects of piscicide, see responses to Concerns 38, 39, and 40, and chapter 4 of the Restoration Plan/FEIS. For detailed descriptions of the methods summarized in this response, see chapter 2, Elements Common to all Action Alternatives.

Concern 37: *The plan needs to provide additional information on the past stocking program in SEKI.*

Representative Quote:
The Plan notes stocking occurred until 1988. Would it be possible for you to expand on that or provide a record of stocking history of SEKI (or direct me to the information)? [Unaffiliated Individual, #52]

Response: There is no book or report that summarizes all of the nonnative fish stocking that occurred in the parks between the mid-1800s and late 1980s. There are several references that provide a history and/or analyze the status of nonnative fish in the high Sierra (e.g., Christenson 1977, Knapp 1996, Moyle 2002). Early stocking in SEKI was done by various citizens, later stocking was done by early park managers, and stocking from about the 1920s until 1988 was done by the state of California under authorization from SEKI. While many stocking records exist, the records are not 100% complete or meticulous. SEKI terminated nearly all stocking in the mid-1970s, while periodically stocking approximately 16 popular fishing lakes until 1988, when all stocking was terminated.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

EFFECTS OF PISCICIDE USE

Concern 38: *The NPS has not fully disclosed the long-term effects on benthic macroinvertebrates from the application of piscicides.*

Representative Quote:
These poisons cause long-term impacts on aquatic and terrestrial food webs, on aquatic animal communities, and may lead to extinction of some native, aquatic, non-target species. [Unaffiliated Individual, #51]

Response: The effects of rotenone (CFT Legumine™) on the invertebrates that occur in SEKI's high elevation aquatic ecosystems are collectively analyzed in detail in the Restoration Plan/FEIS (chapter 4, Wildlife; and appendix G, Ecological Risk Assessment).

There is abundant evidence that invertebrate abundance and taxa richness recovers following piscicide treatments. Recovery time can range from a few months to several years and depends upon factors such as physical environments, season of year, and how treatments are conducted (Binns 1967, Cook and Moore 1969, Beal and Anderson 1993, Mangum and Madrigal 1999, Melaas et al. 2001, Whelan 2002, Finlayson et al. 2010B). Full ecosystem function is expected to return within 1-3 years, with the native aquatic invertebrate community resembling what is typically found in native fishless habitat, which is the historic condition of all project areas.

Extirpation of highly specialized species that are restricted to narrow localized habitats could occur if treatments were applied to isolated habitats that promote endemism. However, the treatment areas are not isolated; they are in habitats connected to or near untreated source populations. Therefore, the potential for complete elimination of a species that could not recolonize via drift or aerial migration would be extremely rare, and recolonization would occur relatively quickly. Endemism is expected to be fairly uncommon in SEKI's high elevation lakes and streams (Ward 1994), in part because of (1) the similarity of these habitats within a particular mountain range, and (2) many native taxa in these habitats are aquatic insects that have an aerial stage that can disperse widely among drainages.

Concern 39: *The NPS must fully disclose the effects of the use of piscicides on water quality, including the short and long-term effects on water clarity and color, information on the breakdown of the rotenone and other ingredients, and information on the effects to water quality from the use of potassium permanganate.*

The NPS must fully disclose the persistence of rotenone in lake and stream sediments.

Representative Quotes:
The DEIS does acknowledge that rotenone has half-life of 20 days in cold water. (DEIS at 217), that it completely degrades within 1-8 weeks (DEIS at 217) and has half-life of 7.8 to 15 days (Id.). Twenty days duration where the poison is still exposing wildlife, humans, and environmental resources to a toxicant is not a short amount of time. [Non-governmental Organization, #123]

Rotenone and its derivatives are discussed in the document, but potassium permanganate application needs to be included, too. Perhaps it is in the document but I could not find such justification in a prominent place. Such justification needs to be much more visible, since potassium permanganate must be co-applied with rotenone. [Unaffiliated Individual, #91]

How persistent will rotenone be in lake and stream sediments? Will it return to the water when those sediments are disturbed by people and animal packers crossing streams and being in shallow lake water? Will seasonal flooding disturb the sediments also? [Unaffiliated Individual, #84]

Response: The Restoration Plan/FEIS (chapter 4 and appendix G) provides a thorough analysis of how each alternative would affect water quality including rotenone persistence.

The available evidence indicates that rotenone:

- would likely be well below any human or wildlife health risk within days of the treatment (EPA 2007A, Brown and Zale 2012, NOCA 2013);
- would likely break down to undetectable levels within 2 months in most areas (Finlayson et al. 2014), partially because rotenone naturally degrades rapidly after just two days, and partially because the montane stream systems being considered are often turbulent and well-mixed, which helps increase the breakdown and dissipation of rotenone (Finlayson et al. 2010A). Although rotenone may persist in lakes for a longer duration, the longest rotenone is expected to be detectable in a lake is 160 days (EPA 2007A, Vasquez et al. 2012); and
- has not been detected in repeated groundwater sampling efforts (Finlayson et al. 2001, CADHS 2007, Finlayson et al. 2014), which alleviates drinking water concerns. These projects sampled surface and groundwater for rotenone after lake and stream treatments for trout removal in California and Oregon (Finlayson et al. 2001, 2014) and pike removal from a California reservoir (CADHS 2007). These lake and stream projects are comparable to the proposed use of rotenone in SEKI, except that they occurred in less remote areas and wells were available for sampling groundwater.

In addition, potassium permanganate ($KMnO_4$) neutralization stations would be used in system outlets to further reduce water quality impacts by detoxifying rotenone. Should rotenone ingredients get past a neutralization station, they are expected to dissipate and degrade in the environment, likely faster than within the treatment area (Brown and Zale 2012). This is because the original concentration being applied within the treatment area immediately starts getting diluted the further it moves downstream. By the time it leaves the treatment area, it would be at a lower concentration than within the treatment area and should degrade more quickly. The rate at which dilution occurs varies depending on hydrology, including yearly and seasonal conditions that determine how much groundwater and headwaters contribute to the stream.

Potassium permanganate itself would also likely have an adverse impact on aquatic organisms from the neutralization station to 30 minutes of travel time downstream of the station (Marking and Bills 1975, Hobbs et al. 2006). This area is considered part of the affected treatment area for the project, and fish as well as non-target organisms would be monitored in this area. Potassium permanganate does not travel long distances downstream and is not persistent in the environment because it is quickly reduced through natural processes (FWS 2010). While potassium permanganate could be toxic to terrestrial organisms at high concentrations, the chemical is routinely used to treat potable water supplies for oxidizing contaminants, colors, and odors (Tucker and Boyd 1977, Chen and Yeh 2005; Dash et al. 2009). Levels of potassium permanganate in treated waters for this project would be below concentrations of potassium permanganate used to remove oxidizing agents in potable water.

Concern 40: *The NPS needs to better explain the effects of rotenone on human health, specifically links to Parkinson's disease and the link to hormone disruption and other human health concerns.*

Representative Quotes:
Protections from exposure to rotenone and its ingredients, however, are not well-identified or analyzed. Thus the protections for the public provided in the DEIS do not appear well developed and the direct effects of applying rotenone are not adequately analyzed. [Non-governmental Organization, #123]

The DEIS ignores all recent findings regarding the connection between rotenone and Parkinson's disease. [Unaffiliated Individual, #98]

Response: The Restoration Plan/FEIS (chapter 4 and appendix H) provides a thorough analysis of how piscicide use would affect human health.

- The general public would have almost no risk of coming into contact with undiluted rotenone due to secure storage, transportation, and labeling practices required by the product label. Exposure to diluted rotenone in treated water is possible but unlikely because project areas would be closed for at least 72 hours following piscicide treatments (Restoration Plan/FEIS, chapter 4, Visitor Experience and Recreation). The use of press releases, notification via the SEKI website, information distributed with wilderness permits, and signs (located at trailheads, ranger stations, and other strategic places in the treatment area) would aid in public awareness. In addition, field crews would search for visitors in the area and notify them of the treatment. Since many of the treatment sites are away from popular visitor use areas, these areas generally have little visitation.

  If, despite these precautions, the public does come into contact with diluted rotenone, there remains little cause for concern over substantial human health effects. In a review of incidents of human exposure to rotenone for all previously registered uses (piscicidal, agricultural, and residential), the EPA (2007A) found that eye irritation was the most commonly reported symptom. Also common were dermal irritation, throat irritation, nausea, and coughing. Less common, but more severe, symptoms (including headache, dizziness, peripheral neuropathy, numbness, and tremor) have occasionally been reported (EPA 2007A). However, chemical concentrations to which individuals may have been exposed in these reported incidents were unknown. Additionally, no causal link can be established between the symptoms reported and the application of rotenone. Reports involving individuals who handled rotenone for the now cancelled agricultural and residential uses may not have been using appropriate personal protective equipment and were likely using higher rotenone concentrations than those to which members of the public could be exposed during piscicide treatments. The EPA (2007A) also noted that "No fatalities or systemic poisonings were reported in relation to ordinary use." The few incidents involving poisoning or death were via accidental (e.g., De Wilde et al. 1986) or intentional (e.g., Wood et al. 2005) ingestion of concentrated rotenone.

- The only human receptors at any measurable risk would be the crew members applying the piscicide. However, those involved in rotenone applications for fish management are required to wear personal protective equipment, including respirators, coveralls, gloves, and goggles, which effectively eliminates potential routes of significant exposure. In addition, ambient air samples near treatment sites showed no rotenone above the detection limit.

Regarding Parkinson's disease (PD) specifically:

- Studies that have suggested a link between PD and rotenone (e.g., Betarbet et al. 2000, Cannon et al. 2009) have been based on laboratory exposure situations under experimental conditions that would not occur in a fisheries management application. As Finlayson et al. (2012, pg. 473) describe: "Collectively, the toxicology and epidemiological studies present no clear evidence that rotenone is causally linked to PD. Even if there were clear evidence, it would have little impact on the current and proposed use of rotenone in fish management. This is because the toxicology studies demonstrating PD-like effects were conducted using routes of exposure (e.g., intraperitoneal or intravenous injection or oral dosing with solvents) and exposure regimes (e.g., weeks to months) not germane to potential human exposure associated with fishery uses." As demonstrated previously, human exposure to rotenone would be already quite limited (particularly for the general public) and exposure routes such as intraperitoneal or intravenous injection or oral dosing with solvents are not possible in the wilderness environment (project area), therefore the NPS finds no evidence to warrant concern about the piscicidal application of rotenone and PD.

Concern 41: *The NPS should disclose the broader effects of rotenone, such as the effects on other vertebrates, wildlife such as birds, and the food web.*

The NPS needs to provide information on how the use of rotenone would affect the MYLF, particularly tadpoles.

Representative Quotes:
NPS failed to adequately identify and analyze the direct effects of rotenone on aquatic ecosystems. [Non-governmental Organization, #123]

Analyze the food web effects of poisoning on terrestrial as well as aquatic communities. Include birds, amphibians, reptiles, mammals, and terrestrial invertebrates that depend on emerging insects for food as well as those that depend on aquatic invertebrate forms for food. [Non-governmental Organization, #123]

Response: The Restoration Plan/FEIS (chapter 4 and appendix G) provides a thorough analysis of how piscicide use would affect the wildlife communities that occur in SEKI's high elevation aquatic ecosystems, including MYLFs, birds, and other vertebrates. This information is summarized below.

Numerous studies show that rotenone applied at concentrations recommended for use in fisheries management (Finlayson et al. 2010A) have little to no long-term effects on the ecosystem (Melaas et al. 2001, Ling 2003, Finlayson et al. 2010B, Vinson et al. 2010, Billman et al. 2012). This is due to a combination of the extremely low concentrations at which rotenone is required to be applied (EPA 2007A) and its unstable nature once applied (Ling 2003), in which it does not persist in the environment (chapter 4, Water Quality; also Vasquez et al. 2012). Rotenone rapidly degrades in the environment, metabolizes in vertebrates, and does not bioaccumulate like fat soluble pollutants (e.g., DDT, PCBs, etc.; Fukami et al. 1969, Gingerich 1986, Ling 2003). Rotenone should be undetectable in the first samples obtained the following summer after treatment. In addition, rotenone use is highly regulated by the EPA, in which it is restricted to fish eradication projects with specific label requirements to be followed during applications (EPA 2007A, Finlayson et al. 2010A). Therefore, when proper procedures are followed, there is little risk for rotenone use to have effects beyond its intended application, due to its limited persistence and limited duration of effects.

Rotenone applications affect all gill-breathing aquatic organisms, including fish, larval invertebrates, zooplankton, and larval amphibians (tadpoles). Because nonnative trout prevent successful MYLF and Pacific treefrog breeding in nearly all locations where they have been established, the vast majority of fish-containing areas that would be treated with piscicides are not expected to contain any tadpoles. Because nonnative fish have occupied the proposed treatment water bodies for decades, MYLFs of all life stages are rarely documented in the areas proposed for piscicide treatment (Vredenburg 2004). If amphibian breeding does successfully occur in a treatment area, most if not all Pacific treefrog and Yosemite toad tadpoles would have already metamorphosed into frogs, many MYLF tadpoles would have metamorphosed, and as many as possible of those that were still tadpoles would be collected for movement out of the treatment area.

Concern 42: *The NPS needs to include information in the plan about the potential for unforeseen consequences, such as needing to treat areas multiple times and with higher rotenone concentrations than anticipated.*

Representative Quotes:
It has been the experience of the Department that single chemical treatments in streams are rarely successful in eradicating all fish and that it is necessary to conduct at least two back-to-back chemical treatments of the same stream reach followed by monitoring. The DEIS is not clear regarding specific areas receiving single or multiple treatments. [California Department of Fish and Wildlife, #117]

There is no conceivable way to achieve uniform concentrations of rotenone in lakes due to the manner in which it is applied and the inability to control the mixing of water. Instead, treated lakes are likely to experience considerable heterogeneity in rotenone concentrations, with some localized areas exceeding the prescribed concentration by many-fold, while other areas never attain lethal concentrations (this is one of several reasons why single treatments often fail to eliminate 100% of targeted fish). [Recreation Group, #110]

Several repeated applications would have to occur in complex locations. In complex habitats aquatic macrophytes and emergent vegetation that typify wetlands and some stream and lake margins, rotenone quickly adsorbs to plants and sediments, effectively lowering the dissolved concentrations in water. [Non-governmental Organization, #123]

Evidence suggests that effective rotenone use requires multiple treatments over multiple years. Consequently, both the ecological and aesthetic impacts would be much more severe than the DEIS suggests. [Unaffiliated Individual, #81]

Response: The Restoration Plan/FEIS discusses the use and effects of piscicide application in numerous places throughout the document and in appendices G and H. While the DEIS stated that piscicide treatments could take up to two years (i.e., a second treatment could occur), the Restoration Plan/FEIS has been updated to reflect that up to three treatments could potentially occur (chapter 2, alternative B, and appendix N). Most sites would require one or two treatments, but unforeseen circumstances could make some sites take up to three treatments.

Goals of piscicide use in fisheries management projects have been diverse, ranging from restructuring fish communities to complete eradication of unwanted fish. Achieving complete eradication may not have been the goal of some past piscicide projects and is a major reason why some projects have involved multiple treatments. The goal of SEKI's proposed piscicide use is to achieve complete fish eradication using the fewest number of treatments.

While none of the action alternatives, including alternative B, are guaranteed to meet project objectives, complete fish eradication using piscicides is expected to be achieved. While some of the proposed treatment areas in SEKI are small (e.g., the outlet stream of Center Basin) and one treatment would likely eradicate all fish in these areas, the Restoration Plan/FEIS clarifies a second or third treatment may be necessary in more complex areas such as lower Sixty Lake Basin.

Complete fish eradication in the time allotted can be achieved because successful treatments by the NPS are much more common in recent years than in the past. For example, from 1938-1986, the NPS conducted piscicide treatments in 22 sites and failed to eradicate fish in nine of these sites (41%); whereas from 1987-2014, the NPS conducted piscicide treatments in 25 sites and failed to eradicate fish in only two of these sites (8%, both in 1987; NPS data). Of the 23 successful piscicide treatments, 15 were completed in one treatment, seven were completed in two treatments (with one of these seven being treated a third time for extra precaution), and one required three treatments (a large area that included many stream miles with complex woody debris). The recent piscicide treatments in which one application eradicated all fish occurred in North Cascades (Rawhouser A., pers. comm., 2016), Yellowstone (Bigelow P., pers. comm., 2015), Great Smoky Mountains (Kulp M., pers. comm., 2015), and Great Basin National Parks (Hamilton et al. 2009). These areas have remained free of the targeted species for up to 15 years following treatment (the earliest of these treatments was in 2000). Identification of sufficient fish barriers is important for preventing fish recolonization. All of these sites are in mountain parks similar to SEKI, but North Cascades is the most similar, with remote wilderness sites and complex habitat. North Cascades successfully eradicated fish after one treatment at three sites from 2009 to 2014. Project managers in numerous National Parks have learned from past mistakes and improved methods to help achieve fish eradication in one or two treatments. Methods used in successful treatments would be incorporated into proposed piscicide treatments in SEKI.

In general, habitat complexity and physical conditions specific to the site help determine the number of rotenone treatments needed. The general protocol would be to treat habitat once in mid/late summer, monitor in September, and monitor again the following early/mid-summer. If live fish are found, a second treatment would be conducted in mid-late summer. If no live fish are found, then a second treatment would not be necessary.

Regarding reports of higher rotenone concentrations than anticipated encountered during some treatments outside SEKI and the potential for them to be duplicated at SEKI, such circumstances are the exception rather than the rule. Based on lessons learned from reviewing both successful and unsuccessful treatments, a number of steps would be implemented to ensure that the proposed action, if chosen, is effective and safe, including but not limited to: (1) treating streams to upper most limits of fish distribution to ensure that there no nonnative fish remain within the treatment area; (2) implementing treatments after all juvenile fish have emerged from stream gravels as rotenone is less effective on eggs; (3) treating a site twice if necessary due to habitat complexity; (4) staffing neutralization stations continuously to ensure there are no equipment malfunctions and that water quality monitoring is conducted; (5) using field colorimeters to monitor potassium permanganate concentrations during treatments (Parmenter and Fujimura 1994); and (6) using current methods and continuous monitoring to monitor concentrations of residual potassium permanganate at the downstream boundary of project areas (30-minute flow time below neutralization station) (Fujimura 2006).

Concern 43: *The NPS needs to provide information on the monitoring plan and how monitoring information will be utilized to adapt future restoration treatments.*

Representative Quote:

I would like a full description of how monitoring information will be utilized to adapt future restoration treatments. [Unaffiliated Individual, #44]

Response: A more complete monitoring and adaptive management framework for piscicide-based fish removals is included in the Restoration Plan/FEIS (appendix N). Intensive monitoring of the initial piscicide treatments would be used to better describe the impacts of subsequent treatments, and if necessary subsequent treatments would be redesigned to further minimize effects.

The framework addresses effects on water quality and stream and lake ecosystems as follows. A more-complete protocol for assessing potential impacts of piscicide treatments on water quality is included in the Restoration Plan/FEIS. Briefly, all water quality testing required as part of permitting to apply piscicides would be met.

The first two to three piscicide treatments would include baseline and post-treatment surveys for stream benthic macroinvertebrates (BMI) and lake zooplankton and BMI to assess potential effects. As described in the Restoration Plan/FEIS, effects are expected to be similar to impacts typically observed in the numerous piscicide treatments that have been conducted in North America in the last 75 years; that is, short-term major adverse effects and long-term moderate adverse effects due to piscicides (Vinson et al. 2010), and long-term beneficial effects due to fish eradication (chapter 4, Wildlife; Knapp et al. 2001). If results from the first two to three treatments are as expected, then BMI and zooplankton surveys would probably not be included in the remaining piscicide treatments.

Concern 44: *The NPS needs to provide information on how the chemicals and inert ingredients in piscicides interact with atmospherically deposited environmental contaminants.*

Representative Quote:
The DEIS underestimates the true impacts of rotenone on aquatic life because it does not account for preexisting toxins, which work synergistically or cumulatively with rotenone to weaken the natural defense systems of organisms. [Non-governmental Organization, #123]

Response: The Restoration Plan/FEIS (appendix G) provides information on the formulation of CFT Legumine™, including all inactive ingredients. Although the DEIS did not provide the percentage that each chemical is present in the formulation, the following text from Vasquez et al. (2012, pg. 1032) provides the percentages for the five chemicals that make up nearly 94% of the formulation: *"The rotenone formulation CFT Legumine is comprised of five major constituents possessing the following average concentrations: rotenone (5.12%), rotenolone (0.718%), methyl pyrrolidone (MP; 9.8%), diethylene glycol monethyl ether (DEGEE; 61.1%), and Fennedefo 99 (17.1%) (McMillin and Finlayson 2008). Rotenolone is a degradation product of rotenone, whereas MP, DEGEE, and Fennedefo 99 are used as solvents and surfactants to aid in the dissolution of rotenone. Rotenone is the active ingredient of CFT Legumine."*

If an alternative piscicide was considered in the future, subsequent environmental compliance would be completed and would include a risk assessment to analyze the environmental consequences (including human health and safety) expected from using the new piscicide; this information would be available for public review.

The neutralization agent is potassium permanganate ($KMnO_4$). As described in the Restoration Plan/FEIS (appendix N), the typical target concentration for neutralizing a piscicide treatment in SEKI is expected to be 3 parts per million $KMnO_4$. See also the response to Concern 39.

Deguelin is a metabolite of the CFT Legumine™ formula. At low concentrations, such as those that would be expected following the breakdown of rotenone after field applications, deguelin has been found to have limited negative effects (Takatsuki et al. 1969, Gerhauser et al. 1997, Kim et al. 2008, Ito et al. 2010, Garcia et al. 2012). However, very high concentrations injected intravenously into rats led to Parkinson's-like symptoms (Caboni et al. 2004). This suggests, like most compounds, that concentration and exposure pathway lead to a broad spectrum of potential biological effects. That is, injecting high concentrations of a chemical directly into the blood stream can have greater adverse effects than being exposed to low concentrations via more common exposure pathways such as skin contact, drinking, or inhaling.

There is no scientific evidence for interactions—either neutral or negative—between atmospherically deposited contaminants and rotenone (or its derivatives). Environmental contaminants have the potential to cause harm to wildlife, especially if combined with other stressors such as disease, competition, and predation. Several studies in the Sierra Nevada have focused on the sublethal effects of contaminants on amphibians (Davidson 2004, Fellers et al. 2004, Sparling and Fellers 2009, Sparling et al. 2014). Laboratory studies have shown certain pesticides can be harmful to amphibians (Sparling and Fellers 2009, 2007), although not all pesticides have produced a negative effect (Davidson et al. 2007). In SEKI, contaminants have been detected in sediment, water, and amphibian tissues (LeNoir et al. 1999, Fellers et al. 2004, Landers et al. 2008). Although there is potential for sublethal effects on amphibians, atmospherically deposited contaminants in the higher elevations of SEKI (where all but one of the proposed restoration sites in which piscicides have been proposed in the Restoration Plan/FEIS are located) have been repeatedly detected only at extremely low concentrations (if at all), below levels at which toxic effects are detectable (LeNoir et al. 1999, Fellers et al. 2004, Bradford et al. 2010). Samples from which higher levels of pesticides have been detected in water, sediment, and tissues were collected at the western edge of the parks (closest to agricultural activity in the Central Valley) or at much lower elevations (LeNoir et al. 1999, Bradford et al. 2010). Additionally, the evidence for correlation between amphibian declines in the Sierra Nevada and pesticide use is based on modeling prevailing wind patterns and presence/absence of amphibians at historically occupied sites (Davidson 2004, Davidson and Knapp 2007). Further analysis has shown little evidence between pesticides use and amphibian declines in the high elevation sites proposed in the Restoration Plan/FEIS (Bradford et al. 2011). However, there is unequivocal evidence for the direct negative impacts on amphibians caused by nonnative fish (Restoration Plan/FEIS, appendix C and Bradford et al. 1993, Vredenburg 2004, Knapp et al. 2007) and disease (Vredenburg et al. 2010A, Bradford et al. 2011).

The information summarized above shows very low concentrations of contaminants detected at high elevations, low concentrations of rotenone and its derivatives applied to eradicate nonnative fish, and strong evidence of direct impacts from fish and disease. Therefore, the long-term benefits to aquatic ecosystems by removing nonnative fish from specific locations using rotenone greatly outweigh the short-term impacts, including possible (but unlikely given current evidence) interactions of rotenone and its derivatives with the extremely low levels of environmental contaminants found in some high elevation locations in SEKI.

EFFECTS ON MYLFs

Concern 45: *The NPS needs to explain the potential impacts on source populations of MYLF used for the translocation program.*

Representative Quotes:
The DEIS fails to adequately disclose the high degree of uncertainty associated with the translocation of MYLFs to habitats from which fish are eradicated. [Recreation Group, #110]

The DEIS fails to disclose the potential impacts of removing frogs from extant populations for the purpose of recolonizing treated areas. Because the Park Service has not provided population estimates for extant MYLF populations, it is impossible to determine the consequences to population viability of removing frogs from these source populations. Small populations are at increased risk of extinction through both demographic and genetic processes. For demographic risks, population levels that will likely lead to persistence depend on natural variation in key vital rates (i.e., births and death rates), so defining minimum viable population sizes is difficult. [Recreation Group, #110]

The DEIS has no discussion of how many frogs would be translocated to new habitats or what this means in terms of the likelihood of successful colonization. As noted, the genetic risks associated with small population size are significant. Consequently, populations that (1) are founded with a small number of translocated individuals and (2) are isolated from sources of colonizers that could potentially infuse new genetic diversity into the population may be highly susceptible to extinction through genetic effects. [Recreation Group, #110]

Response: The effects on MYLF source populations have been evaluated in the Restoration Plan/FEIS (chapter 4 and appendix L). A biological opinion per section 7 of the Endangered Species Act was issued by the FWS on May 25, 2016 (appendix L, FWS Consultations). The provided the determination that the proposed project would not jeopardize the existence of MYLFs and would support recovery efforts of this endangered species.

For each source population, the number of individuals removed at one time would be dependent on the estimated population size. SEKI would use available population data and site-specific experience to propose high-priority actions to the MYLF recovery team. The information would be reviewed by the team, decided by consensus using professional judgment, and would ultimately have to be endorsed by FWS (as the enforcing agency of the ESA) before the action could be implemented. Although there is a chance that a take event could result in reduced population abundance for longer than a one year period, generally limiting translocations to larger source populations would safely provide enough animals to augment a small population or reestablish a population that recently died out, while also providing a fair amount of genetic diversity. However, most of the remaining frog populations are small primarily due to effects from nonnative trout and disease; many populations only have access to small and shallow habitat at risk to drying and warming; and nearly all populations are isolated from each other by long distances of fish-containing habitat. This is an extremely vulnerable situation; and the best chance to recover MYLFs is through a combination of reclaiming habitat via fish eradication, translocations to help increase the size and number of extant populations, and disease treatments to increase frog survival.

Translocations are a critical piece of the strategy. The Restoration Plan/FEIS (chapter 2, Restoration of MYLFs), states that: “MYLF restoration would be based on the best science available, and protocols would be researched, developed, implemented, monitored, and refined in collaboration with other federal and state agencies (e.g., FWS, USFS, USGS, and CDFW) and academic researchers. The approach to reintroductions, including preserving genetic diversity, treating frogs for chytrid fungus, and identifying source populations, would be developed with guidance from the ‘Mountain Yellow-legged Frog Conservation Strategy,’ which is currently being developed by a multi-agency team led by FWS…”

In addition, all actions proposed in this plan that have the potential to affect federally endangered MYLFs, including translocation protocols, would be approved by the FWS in accordance with section 7 of the Endangered Species Act. Therefore, this plan would be heavily research-based, vetted, and the adaptive management component would ensure that protocols are improved over time, or abandoned if not working.

The Restoration Plan/FEIS considers recent research that modeled potential MYLF population responses to disease (chytridiomycosis) over time (Briggs et al. 2010). This research demonstrates that MYLFs have very high reproductive rates, which sometimes leads to overcrowding in large populations that can reduce frog condition and growth. One MYLF population in YOSE that likely has persisted with disease for at least 15-20 years has recovered to a large size. Although the population as a whole is disease-tolerant, many individuals have low disease resistance. In addition, the population is limited by density-dependence. Together, these forces impact a moderate percentage of the frogs in the population, as indicated in annual surveys of this site that repeatedly observe many frogs in poor condition and many in good condition (Knapp unpublished data). This population is large enough for it to have been safely used as a donor population for several translocations, which helps relieve some of the density-dependent pressure on this population. Survey data showed that survival and recruitment increased in the years following translocations (Knapp unpublished data). Therefore, modest frog removals (of generally a small percentage of the population) sometimes have a positive effect on population viability.

Ongoing monitoring, often annually, allows a strong understanding of population distribution, abundance and trends of frog populations and their disease loads. Very small frog populations are not able to safely sustain take, and thus translocations are limited to larger populations, except for emergency situations such as disease outbreaks and severe drought, when salvage would be appropriate to save animals before the population completely dies-off or habitat dries up.

EFFECTS ON WILDERNESS CHARACTER

Concern 46: *The NPS does not adequately evaluate the effects that large work crews, camp areas, the use of helicopters, and the use of stock, will have on wilderness visitors and wilderness character (opportunities for solitude, and undeveloped qualities of wilderness character).*

The NPS does not adequately describe the effects that area closure related to the proposed project would have on opportunities for primitive and unconfined recreation in wilderness.

Representative Quotes:
Crews needed to support chemical treatments are substantially larger (8 to 15 people), meaning greater spatial extent of on the ground impacts (including creation of new hardened campsites that are slow to heal), greater human waste disposal problems, more intrusive fish disposal methods (scattering of fish on the ground), and greater intrusion on wilderness solitude (much like the impacts of large trail crews). [Recreation Group, #110]

Application of chemicals for fish eradication requires excessive use of the trails by stock and equipment, involves closures of areas to backpackers, and sometimes these procedures must be repeated because they are not sufficiently effective the first or second or third time around. [Unaffiliated Individual, #120]

Response: The effects on wilderness character have been evaluated in the Restoration Plan/FEIS (chapter 4 and appendix A). Regardless of the alternative selected, direct impacts from crews and treatment actions are considered minimal. Any impacts from treatment activities, including the presence of work crews, camp areas, helicopters, and stock would be isolated, short-term, and dependent upon the type and timing of the treatments.

If piscicide treatments are approved, there would be some additional effects on wilderness visitors, including short-term restrictions (at least 72 hours) from the immediate area treated with CFT

Legumine™, but again, this impact is minimal. This information is included in the Restoration Plan/FEIS, (chapter 4, Visitor Experience and Recreation).

Through the minimum analysis process conducted as part of the Restoration Plan/FEIS (appendix A), helicopters and stock have been determined to be the minimum tools necessary for accomplishing aquatic restoration goals; these equipment transport options are only used when the loads are too heavy or bulky to be carried in, or where time is of the essence (e.g. translocation timing related to moving live frogs).

EFFECTS FROM STOCK USE

Concern 47: *The plan should provide information on any new restrictions or changes to stock use in the parks as a result of implementing any of the alternatives.*

Representative Quote:
The High Sierra Unit is very much interested in ensuring that none of these alternatives results in a detrimental impact to stock use in Sequoia and Kings Canyon National Parks ('SEKl'). [Unaffiliated Individual, #122]

Response: There would be no new restrictions or changes to stock use in the parks as a result of implementing any of the alternatives. The NPS and FWS (FWS 2014, pgs. 24270-24271) have limited concern about stock use impacts on MYLF populations. Stock use is considered a low magnitude threat to MYLFs, and any threats have been found to be localized (e.g., limiting stock access to certain breeding areas to eliminate potential for effect on vulnerable populations). Like other recreational activities, stock use has historically been a threat of low significance for MYLFs and is projected to remain of limited concern for MYLF conservation. In the future, if new restrictions or changes to stock use are proposed for the protection of MYLF, separate compliance would be completed and would include public review.

EFFECTS ON SOCIOECONOMICS

Concern 48: *The plan needs to disclose the potential effects on the economy of neighboring communities and counties, in particular the socioeconomic effects on Inyo County.*

Representative Quote:
We are concerned regarding the impacts to important components of our local society, culture, history, and economy associated with recreational fishing in the Sierra Nevada. [County Government, #50]

This issue was addressed in the Restoration Plan/FEIS (chapter 1, Issues and Impact Topics, Impact Topics Dismissed from Further Analysis). To elaborate briefly here, even in the most ambitious alternative, angling would remain a prevalent recreation opportunity throughout the parks. Since most of the proposed fish removal waterbodies are outside of high-use areas, and many are relatively small compared with most other fish-containing lakes, social and economic effects on neighboring communities would be negligible.